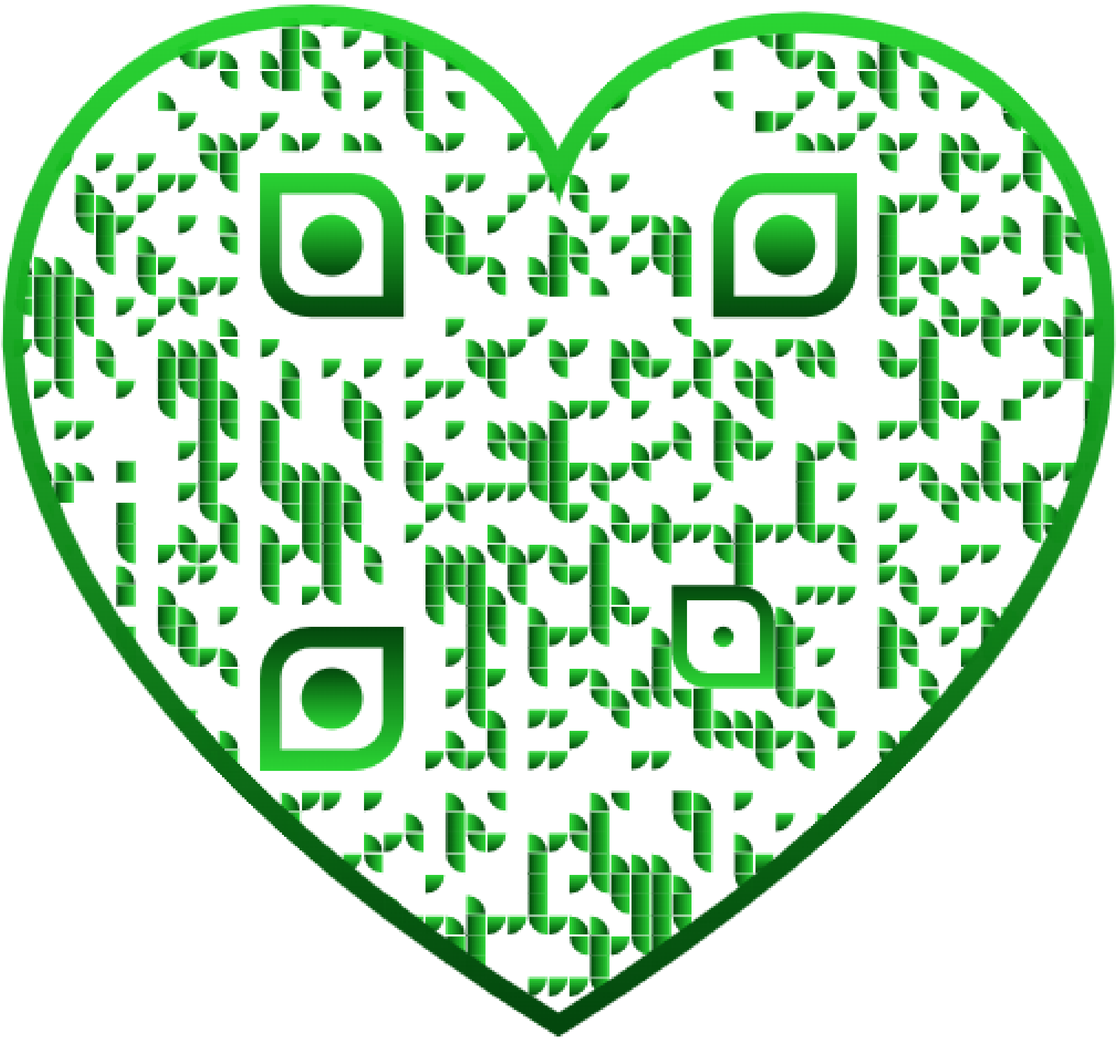
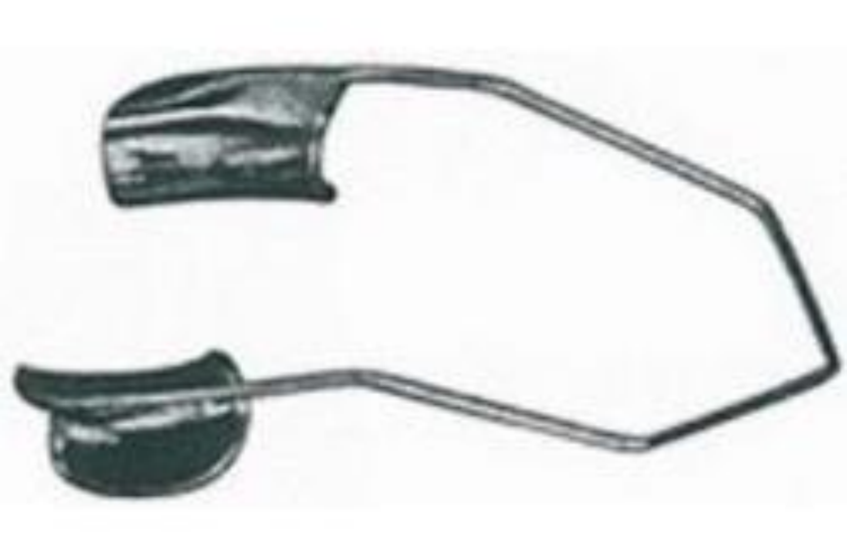
Revision 2019

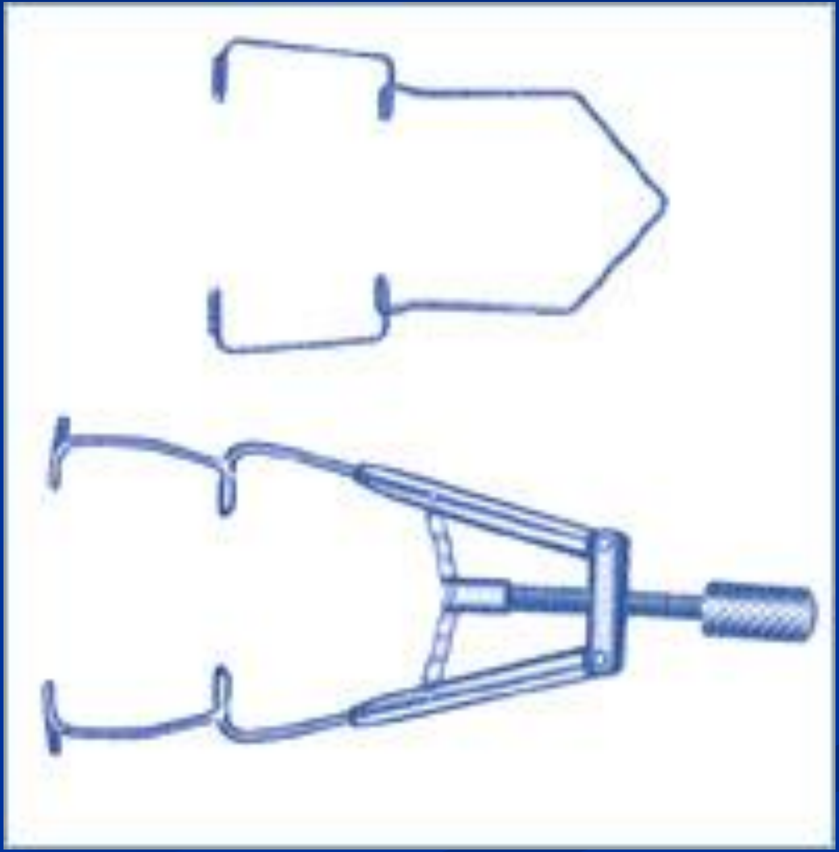


Surgical Instruments

Speculum

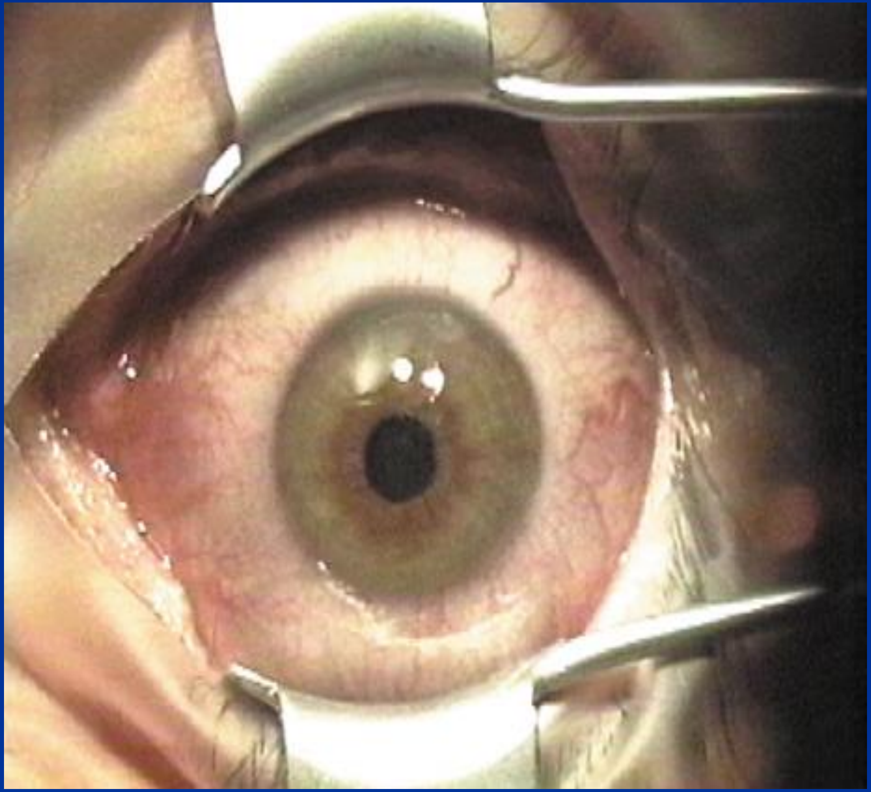
Used to retract the lids in ocular operations

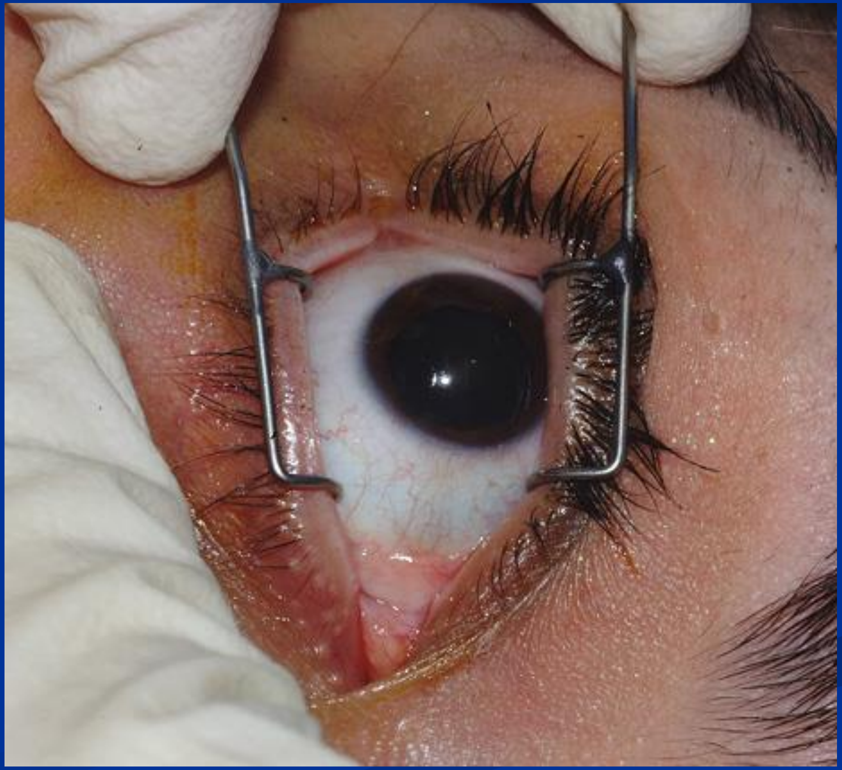




Speculum

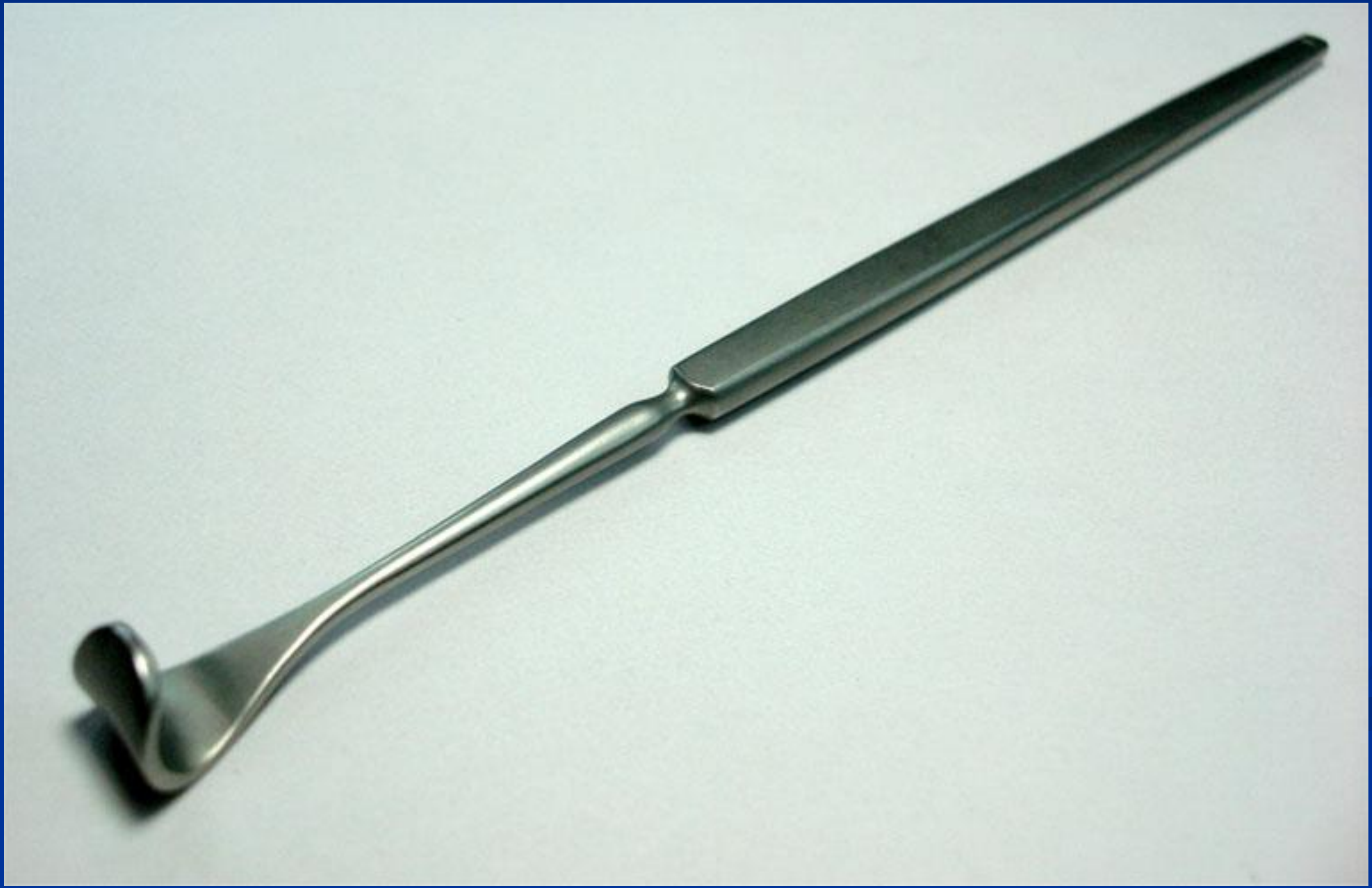
Used to retract the lids in ocular operations





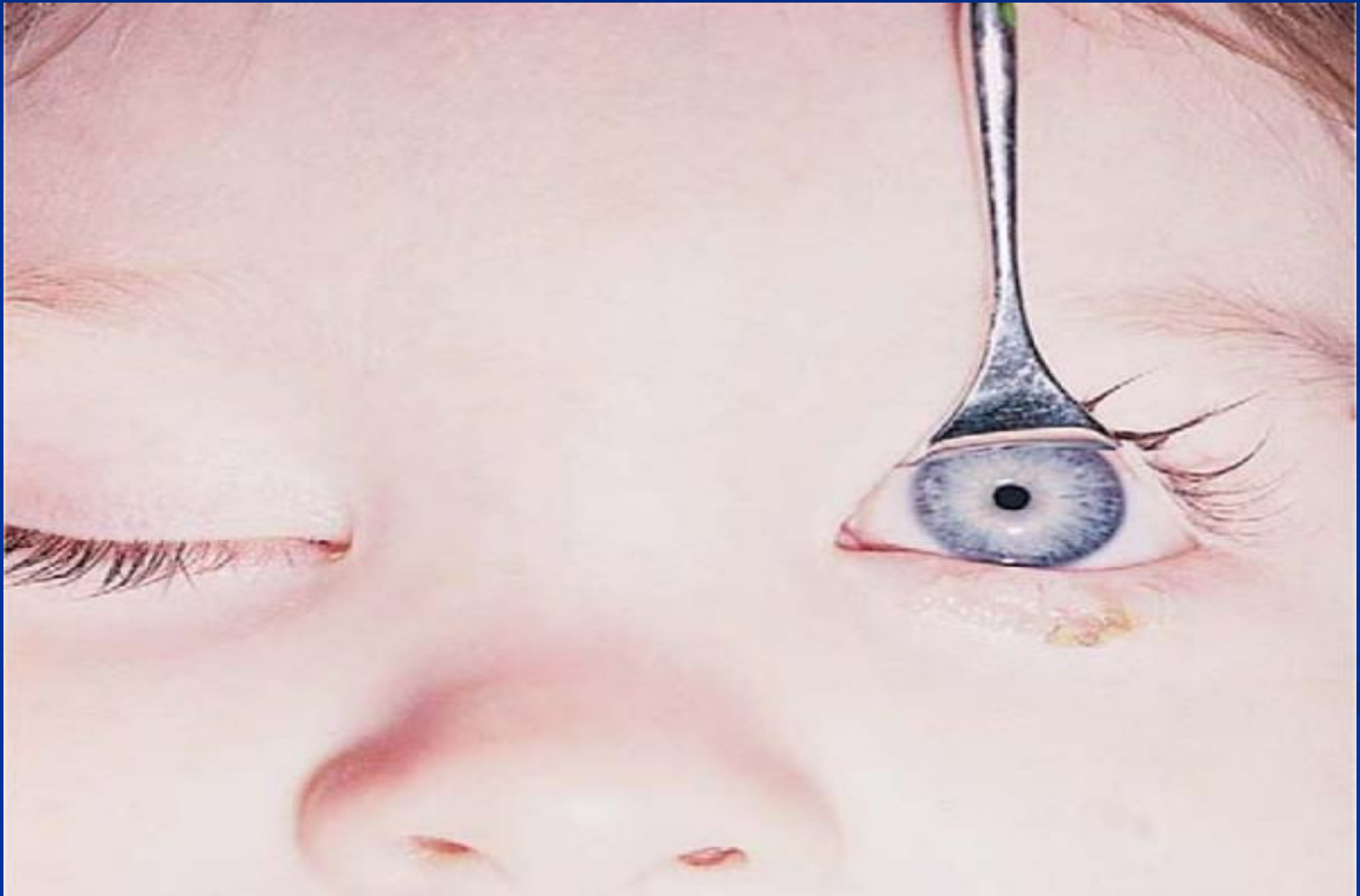
Desmarre's Lid Retractor

Produces eversion of upper lid

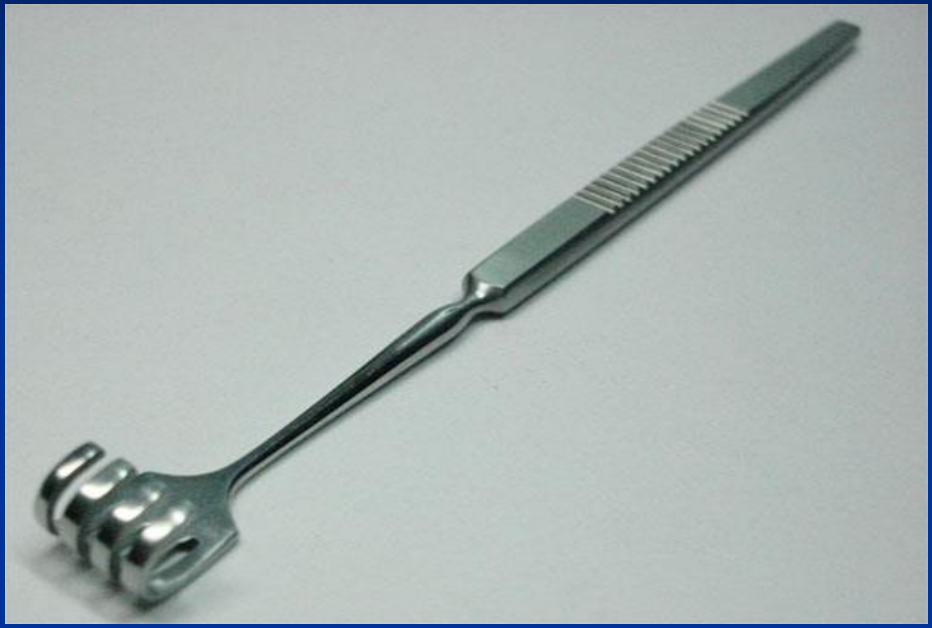


Desmarre's Lid Retractor

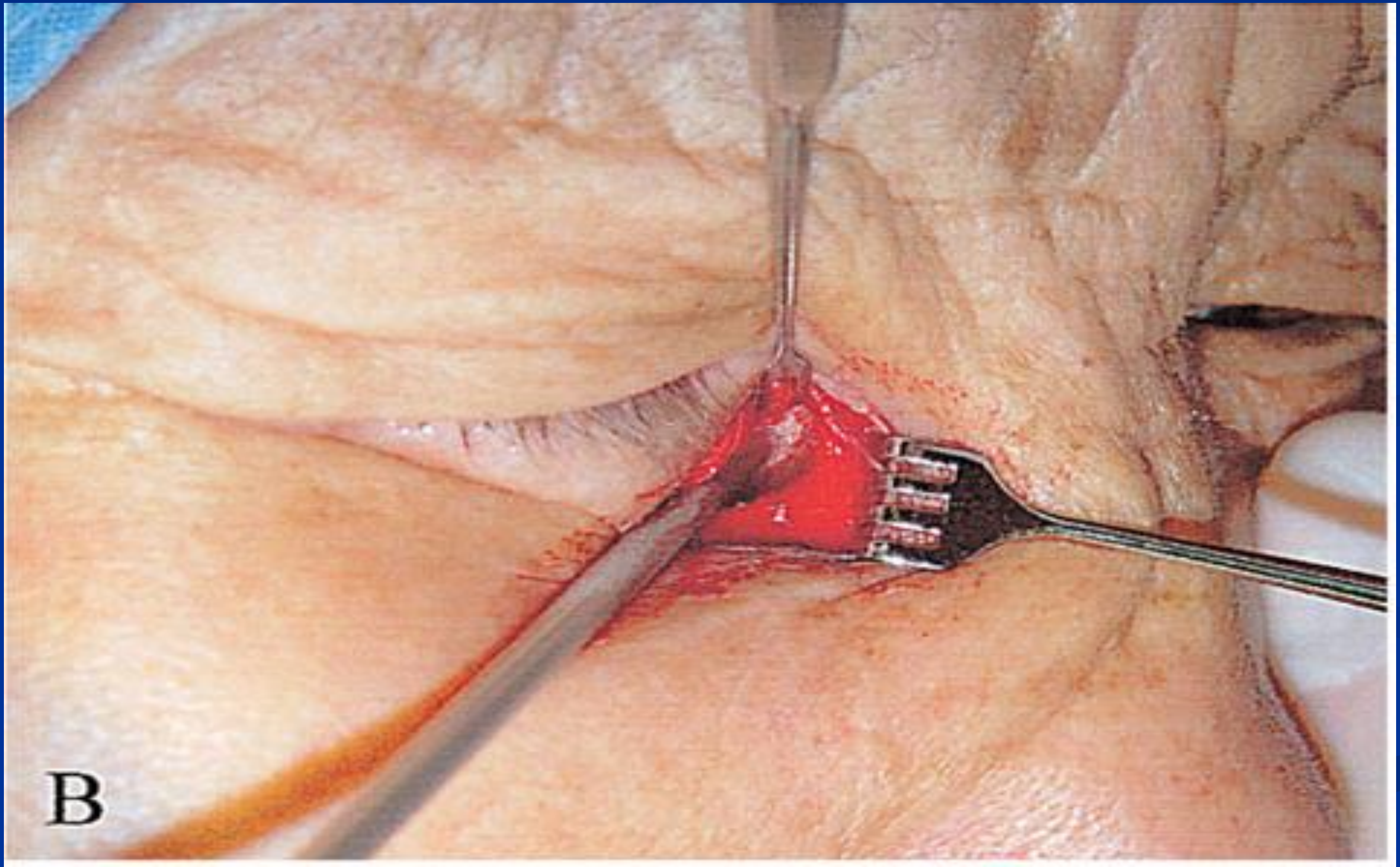
Produces eversion of upper lid



Lacrimal Retractor



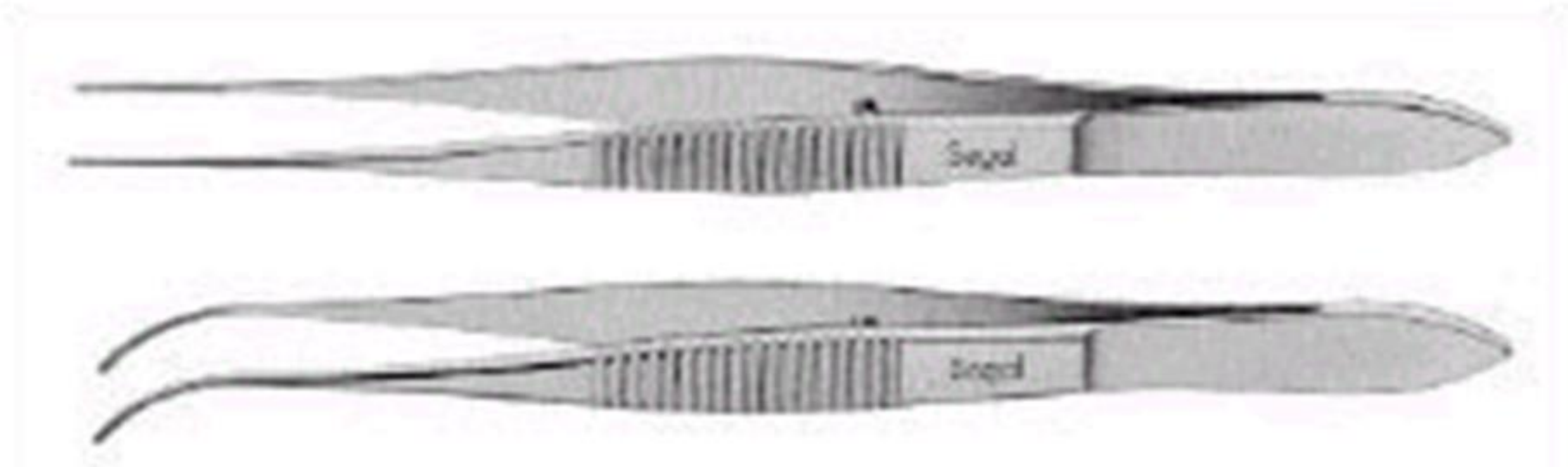
Lacrimal Retractor



FORCEPS

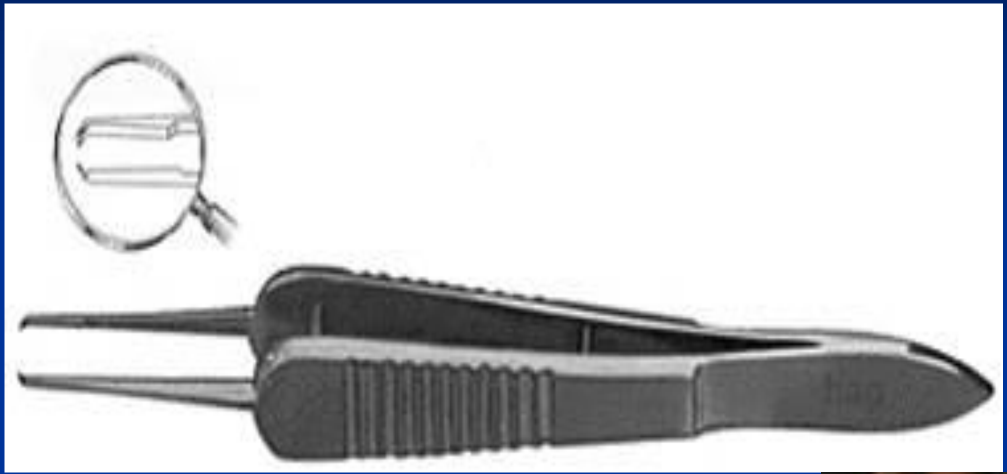
- Corneal Fixation Forceps
- St Martin Tooth Forceps
- Colibri Forceps
- Mc Pherson Tying Forceps
- Capsule Forceps
- Capsulorrhexis Forceps
- Chalazion Forceps

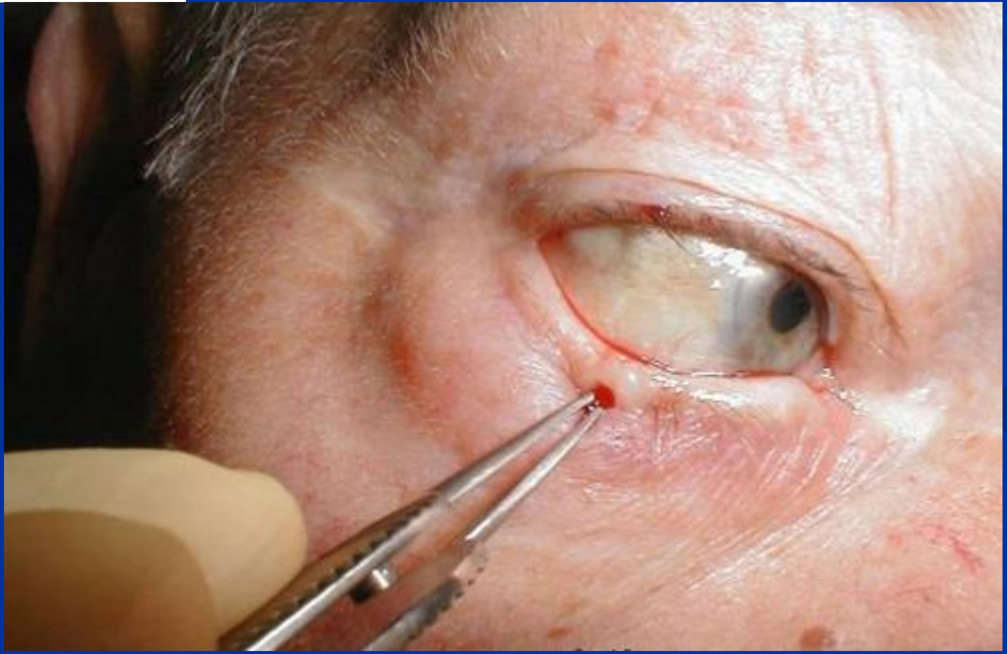
Corneal Fixation Forceps



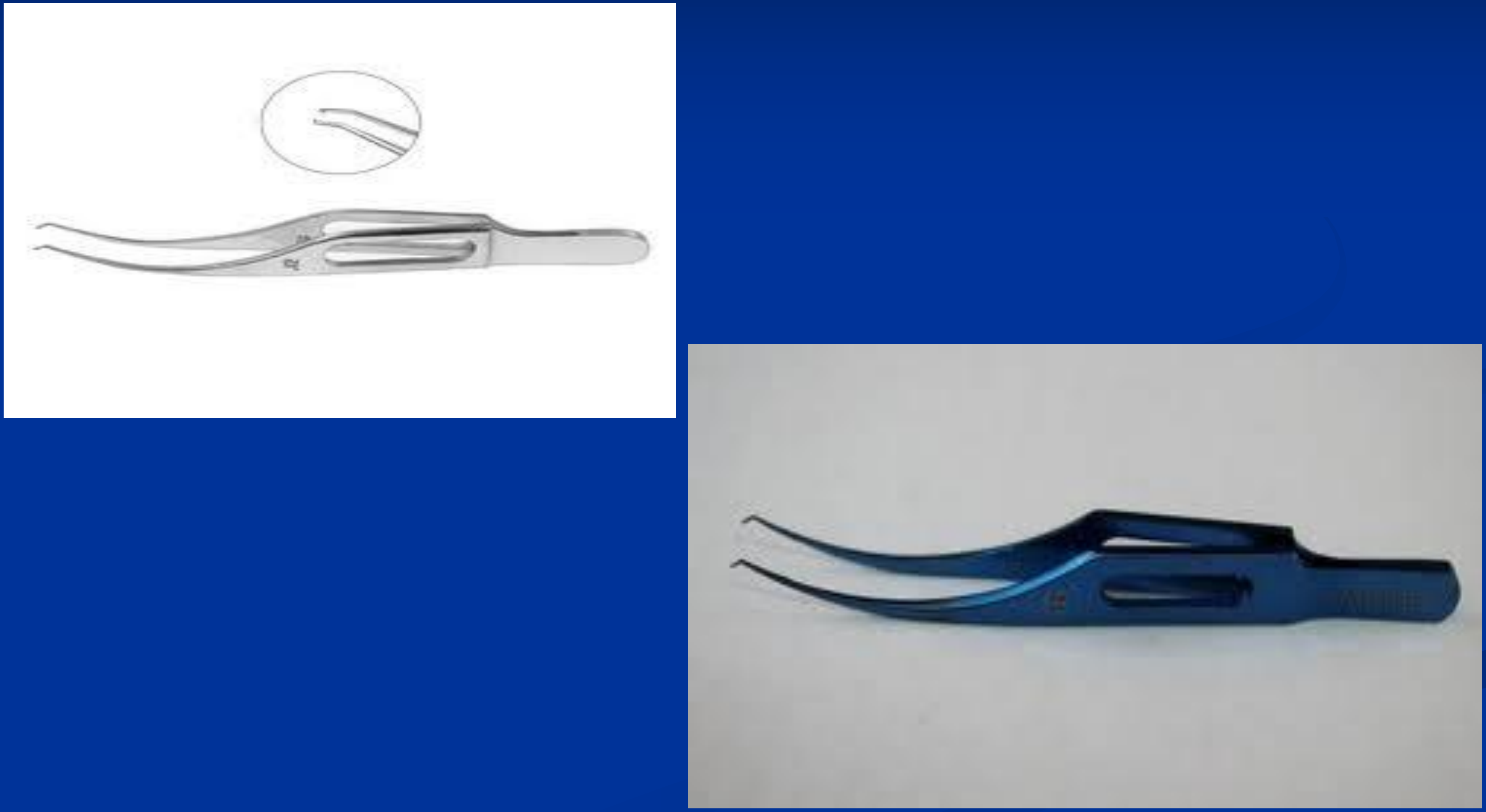
Sagal
Sagal

St Martin Tooth Forceps

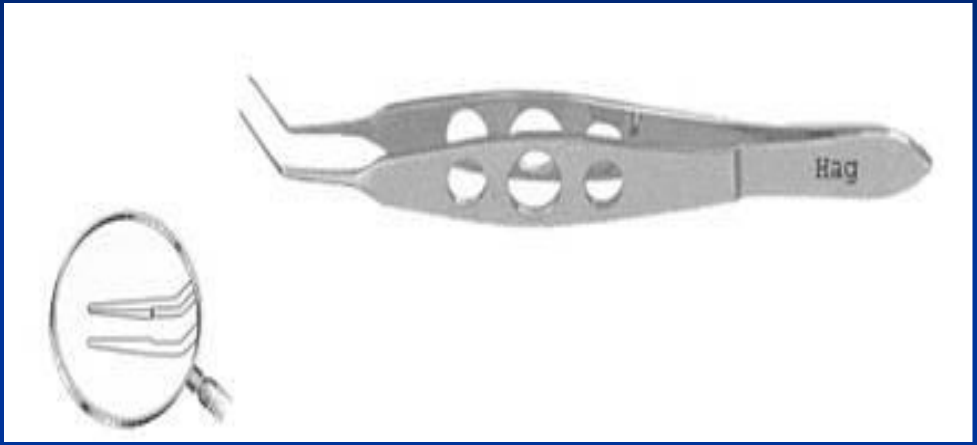


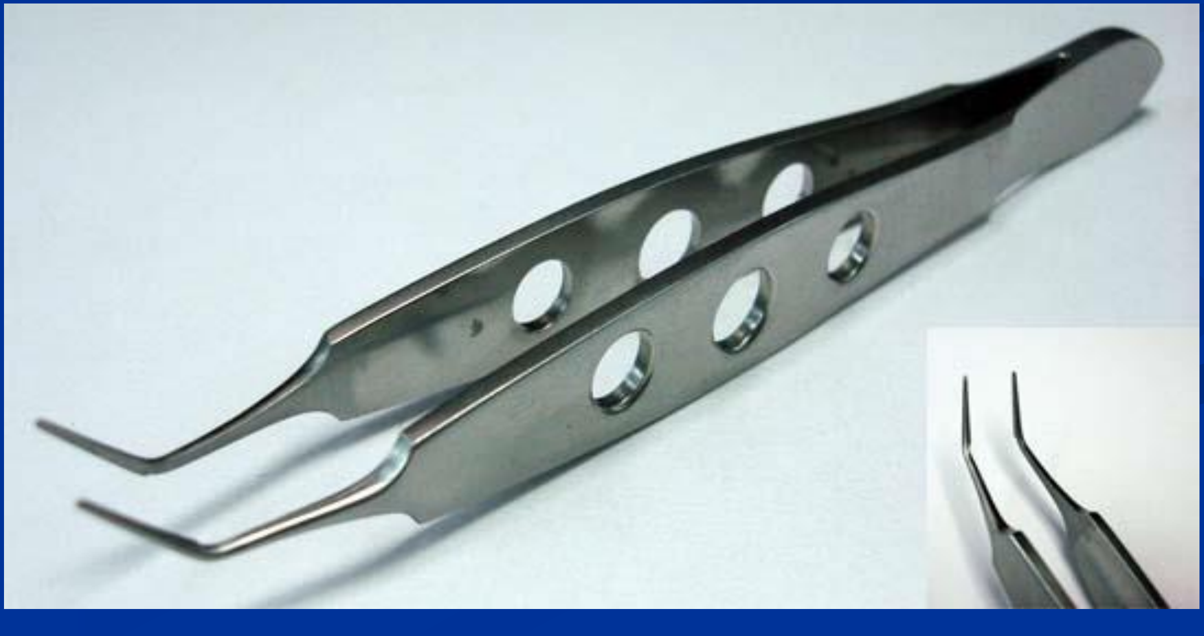


Colibri Forceps

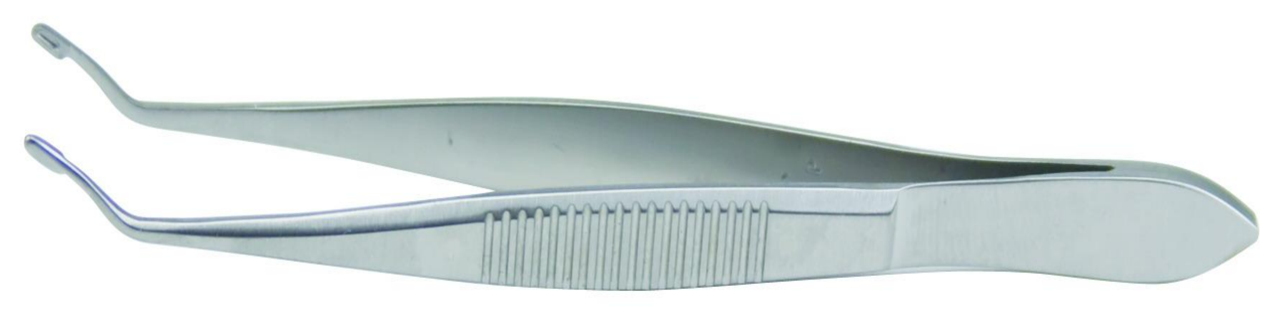


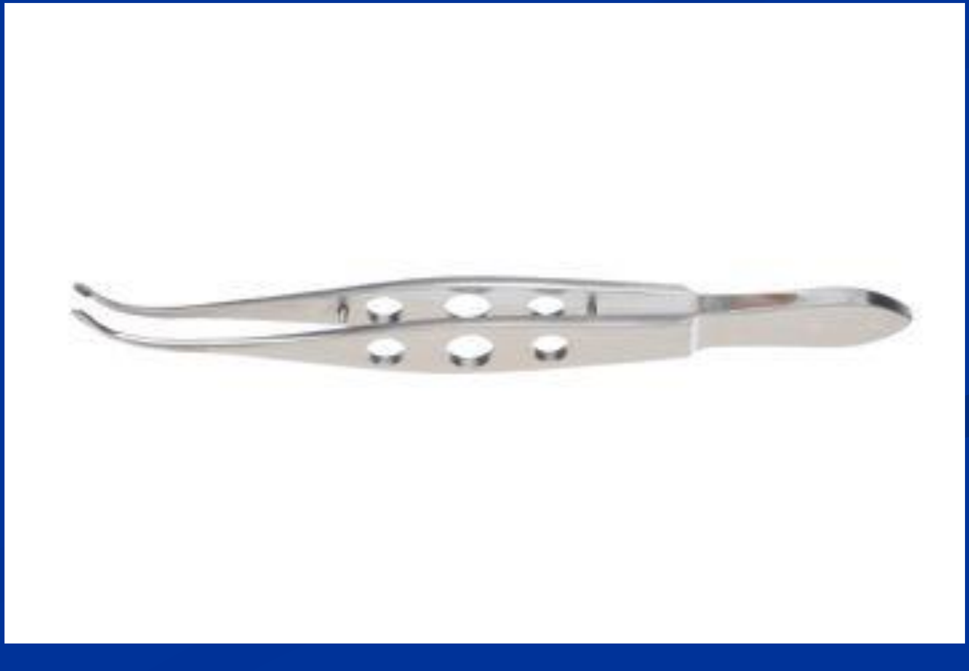
Mc Pherson Tying Forceps



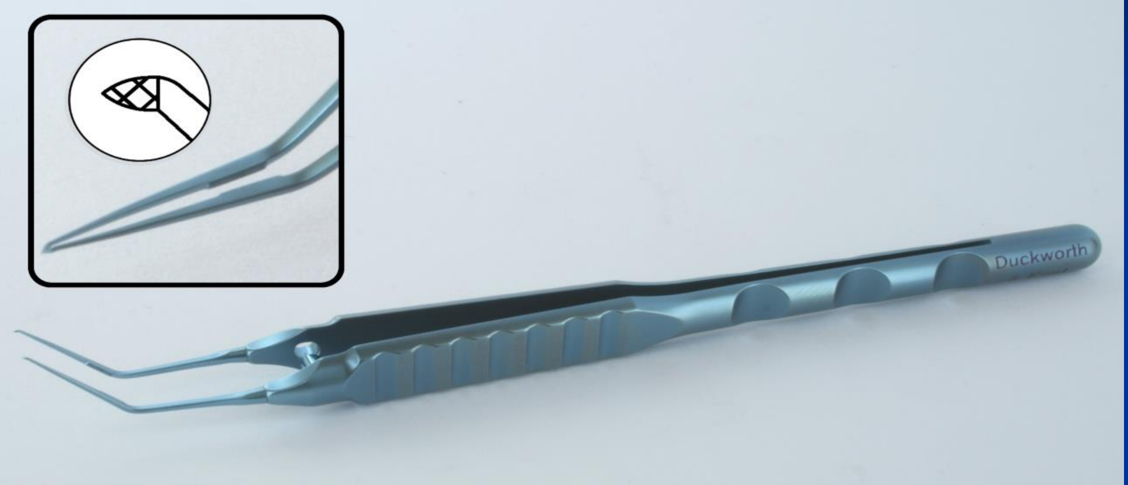


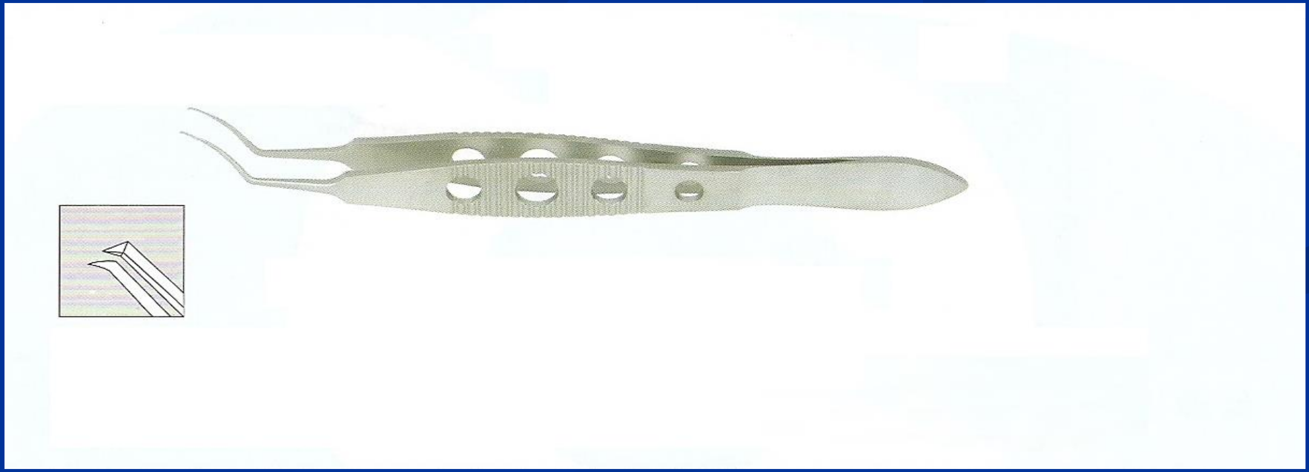
Capsule Forceps



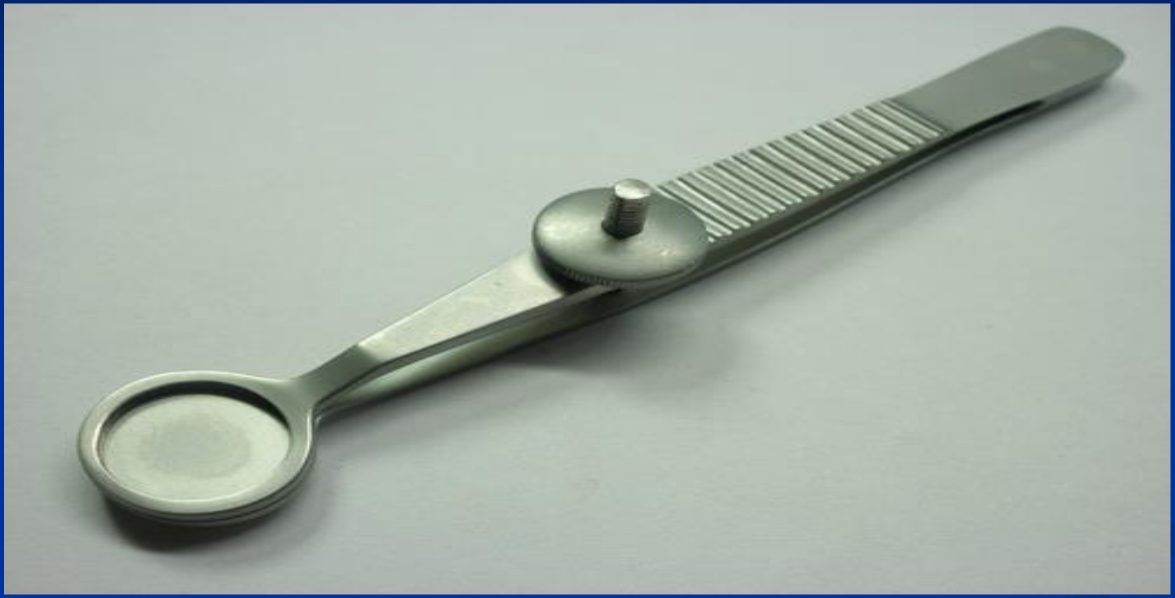


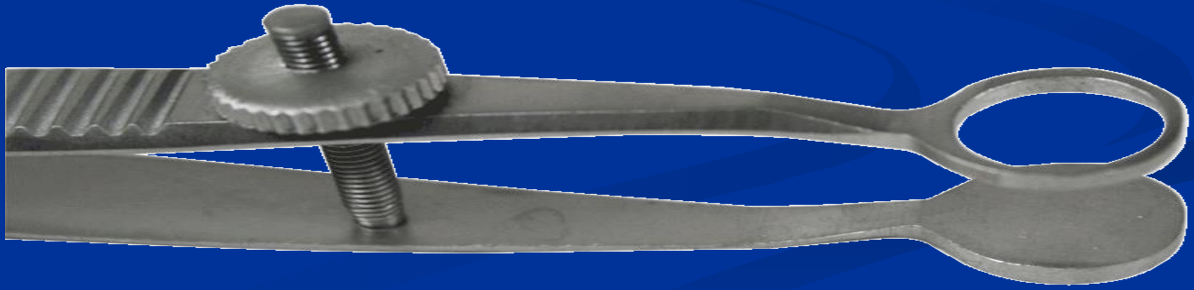
Capsulorrhexis Forceps



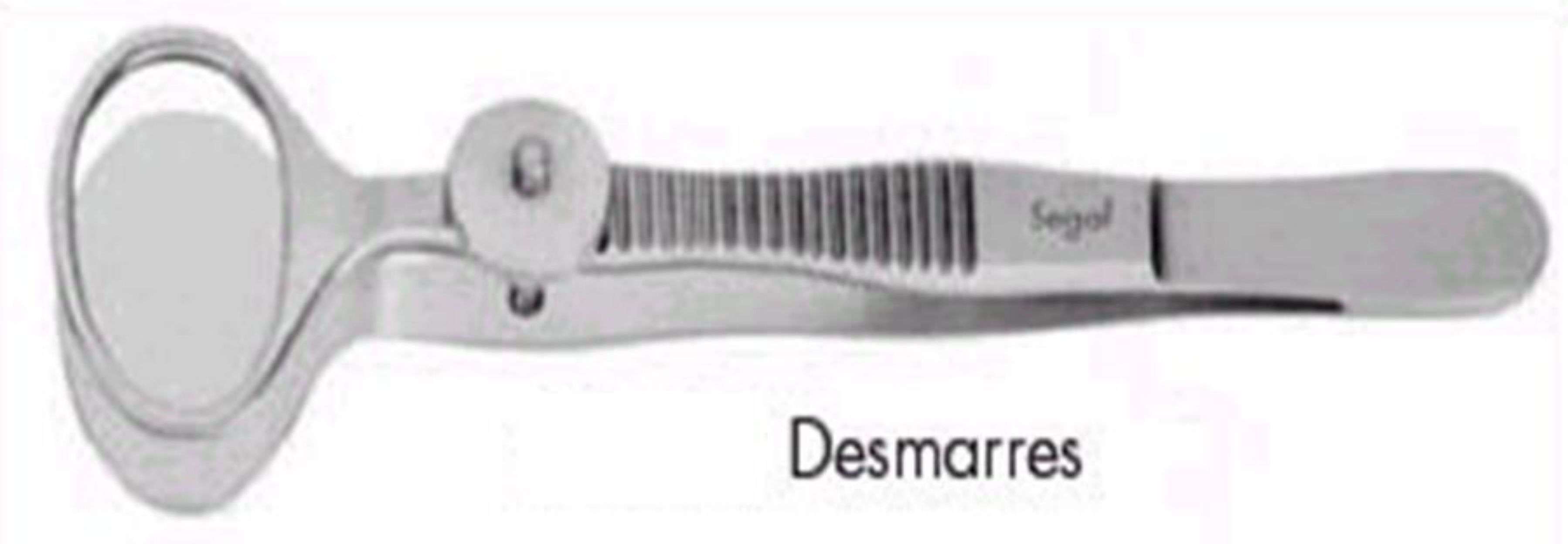


Chalazion Forceps

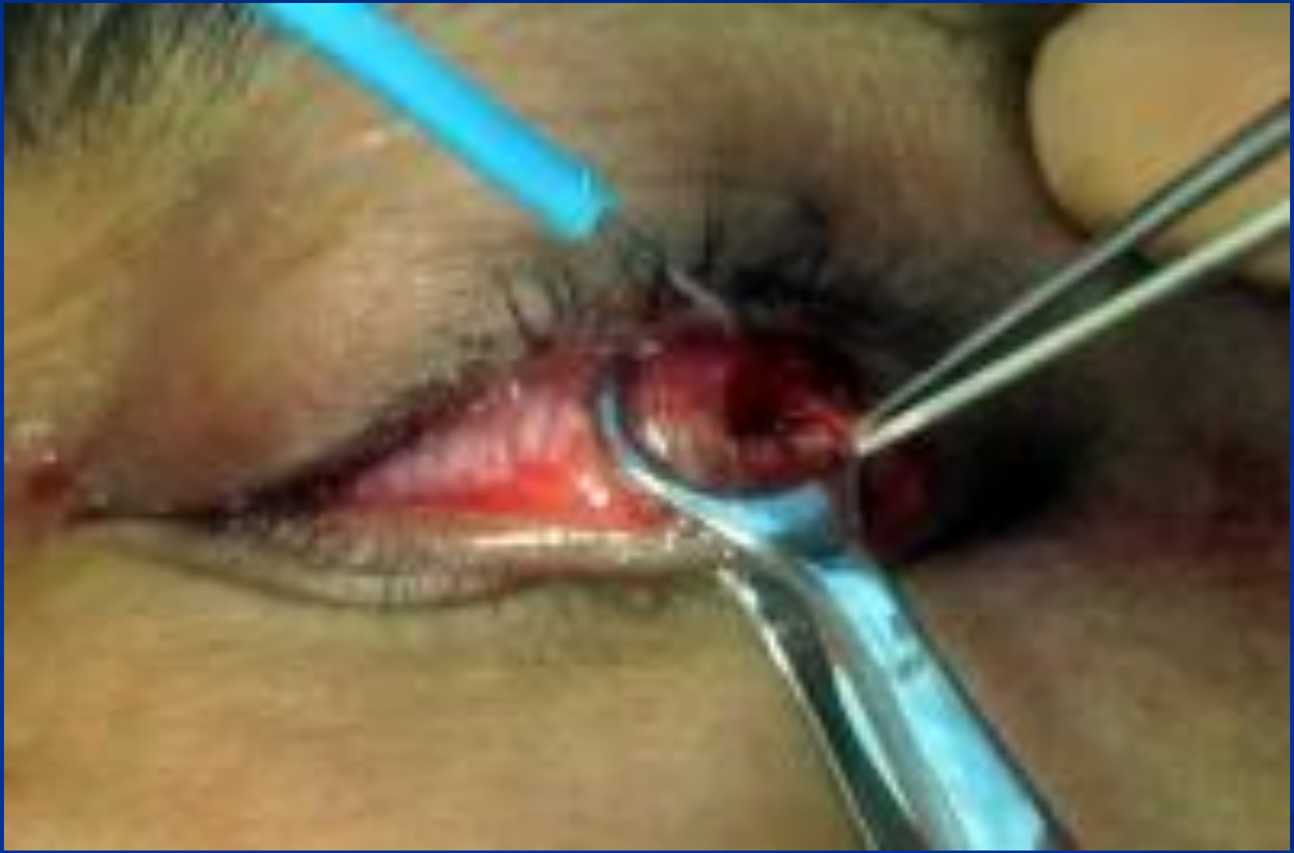




Chalazion Forceps


Segal
Desmarres

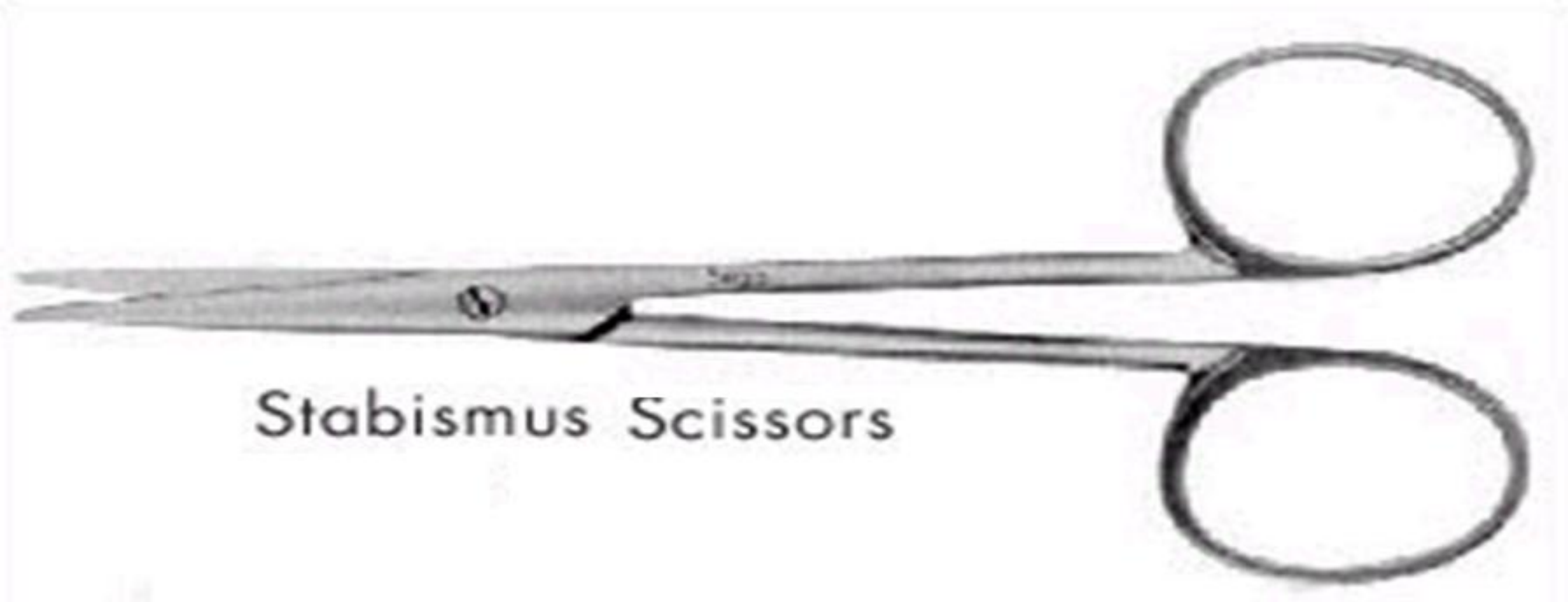
Chalazion Forceps



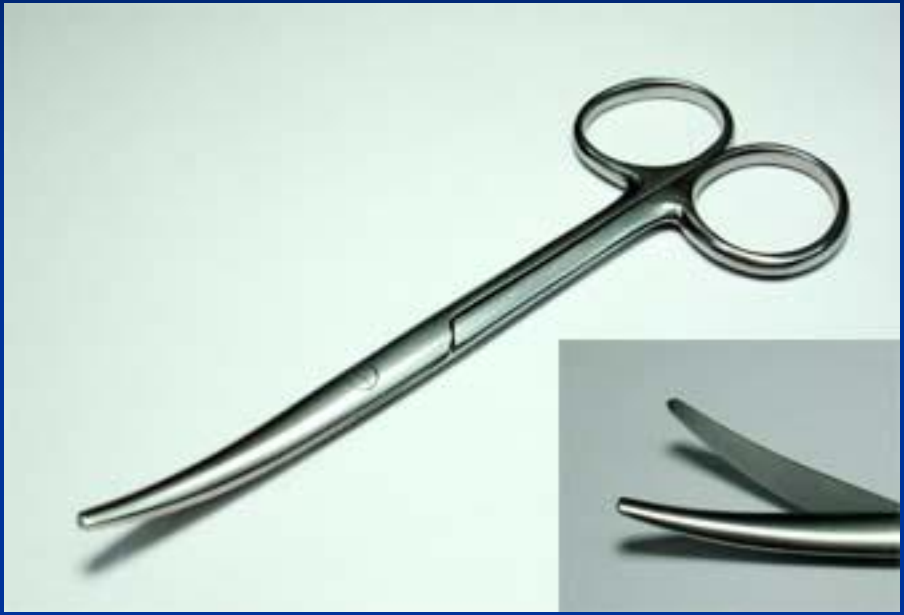
Scissors

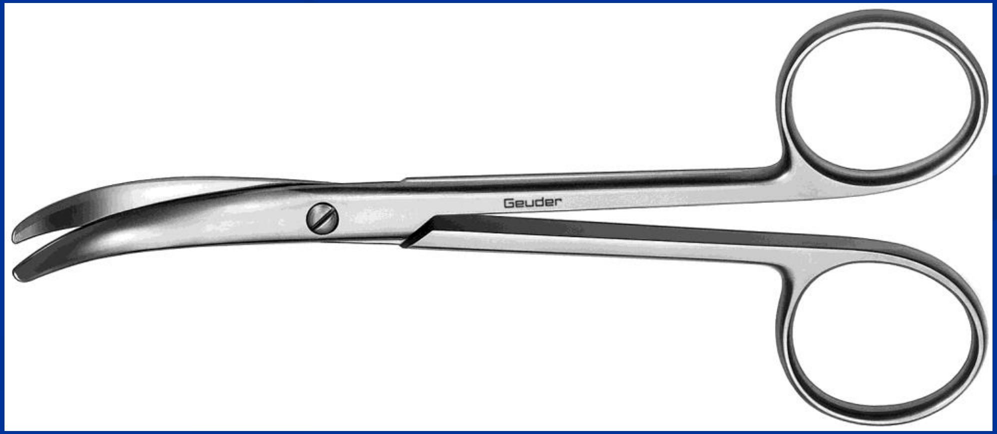
- Strabismus Scissors
- Enucleation Scissors
- Westcott’s Corneal Scissors
- Catroviejo Corneal Scissors
- De Weckers Iris Scissors
- Vannas Scissor

Strabismus Scissors

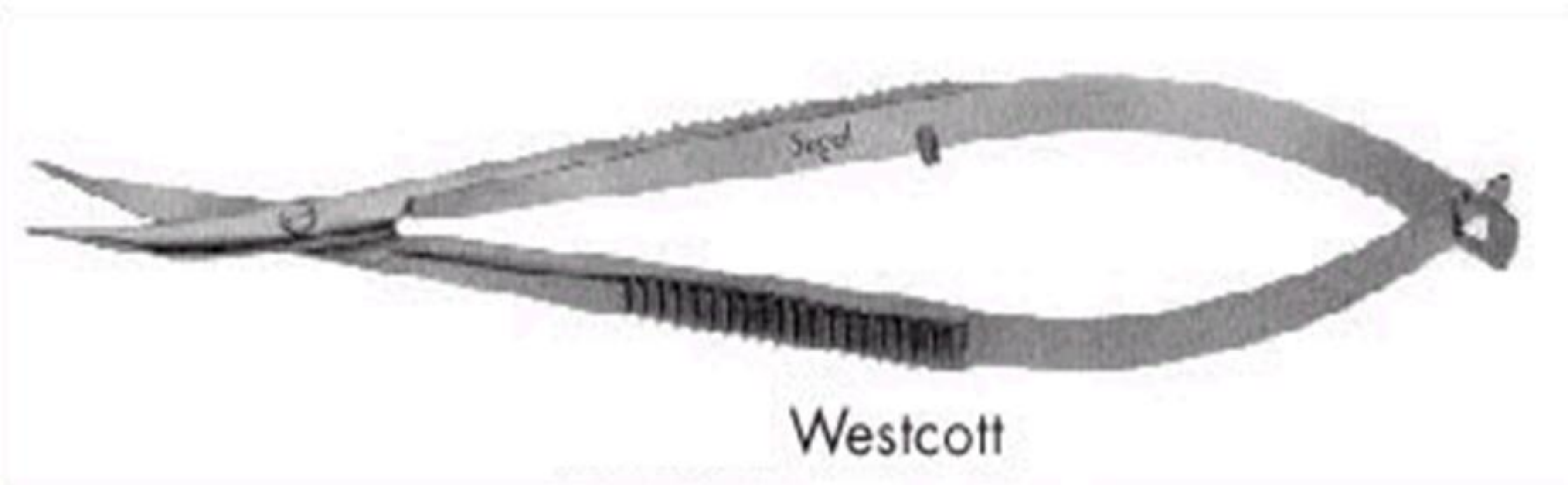

Stabismus Scissors

Enucleation Scissors



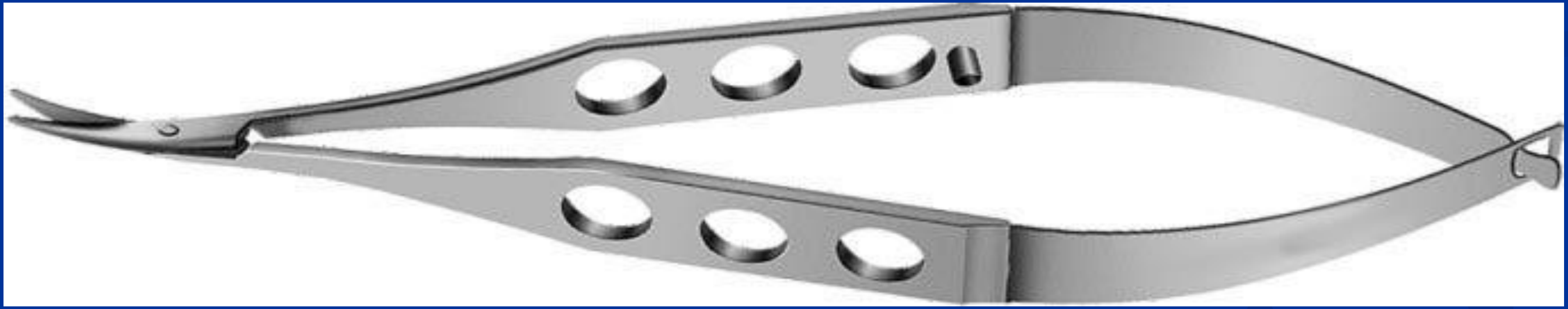


Westcott's Conjunctival & Corneal Scissors

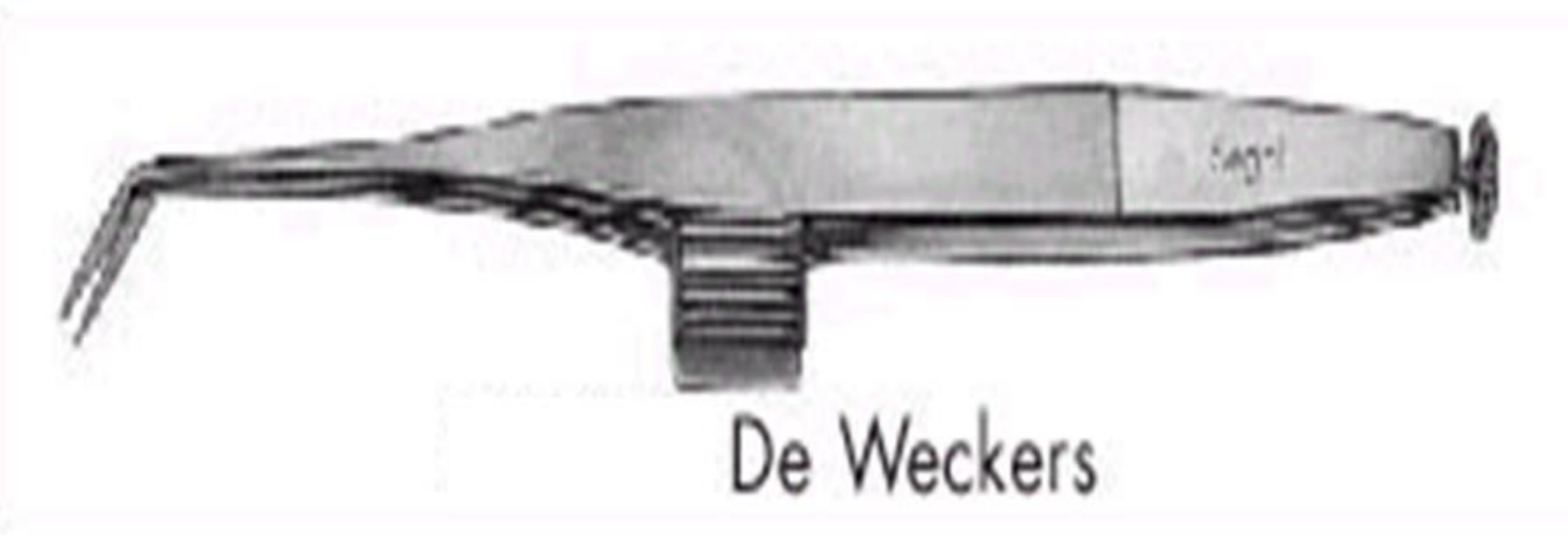


Westcott

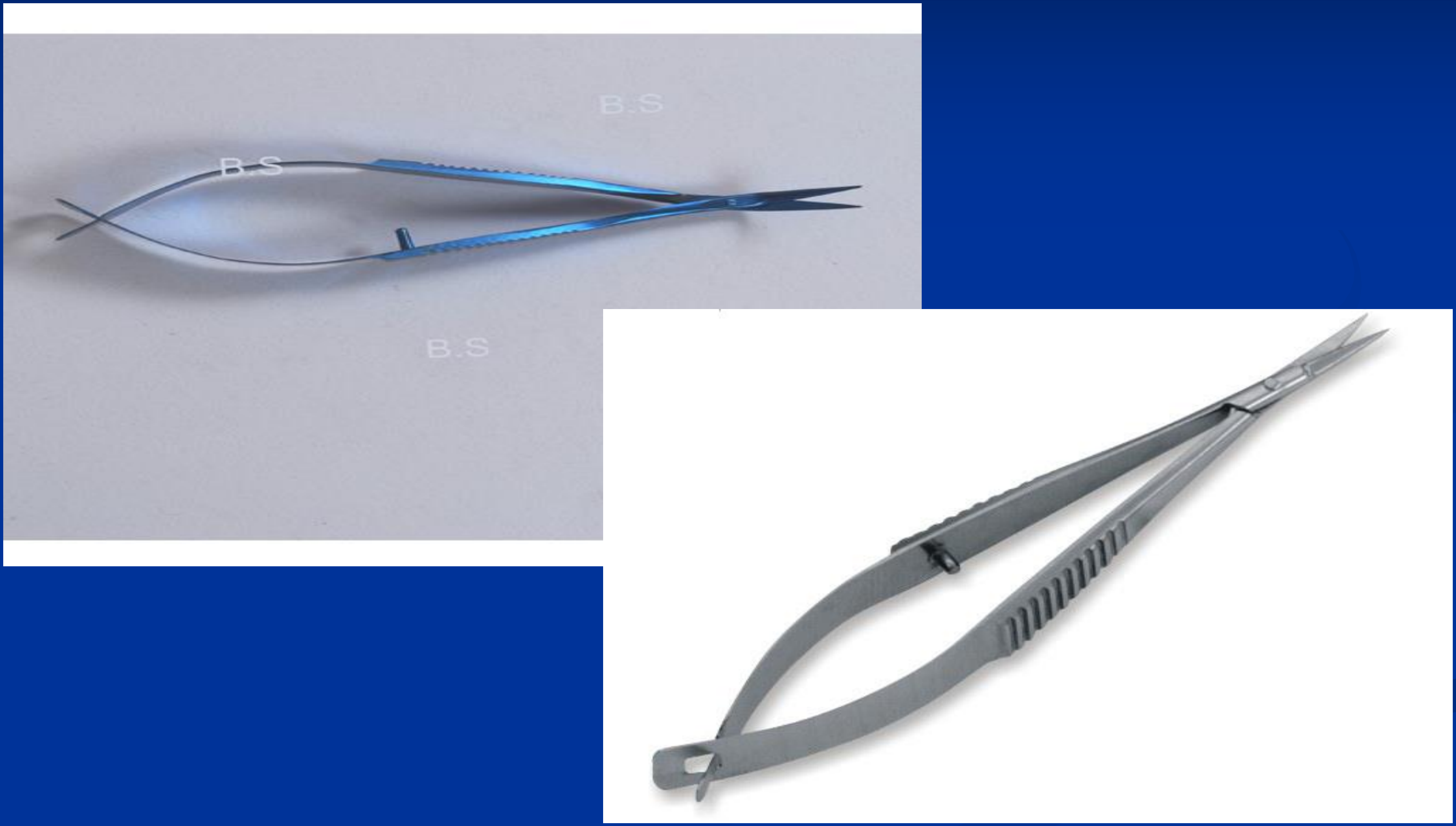
Catroviejo Corneal Scissors



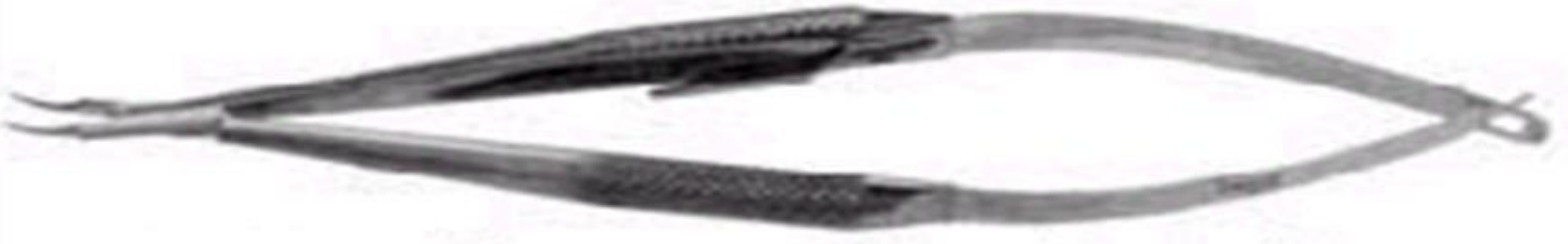
De Weckers Iris Scissors



Vannas Scissor

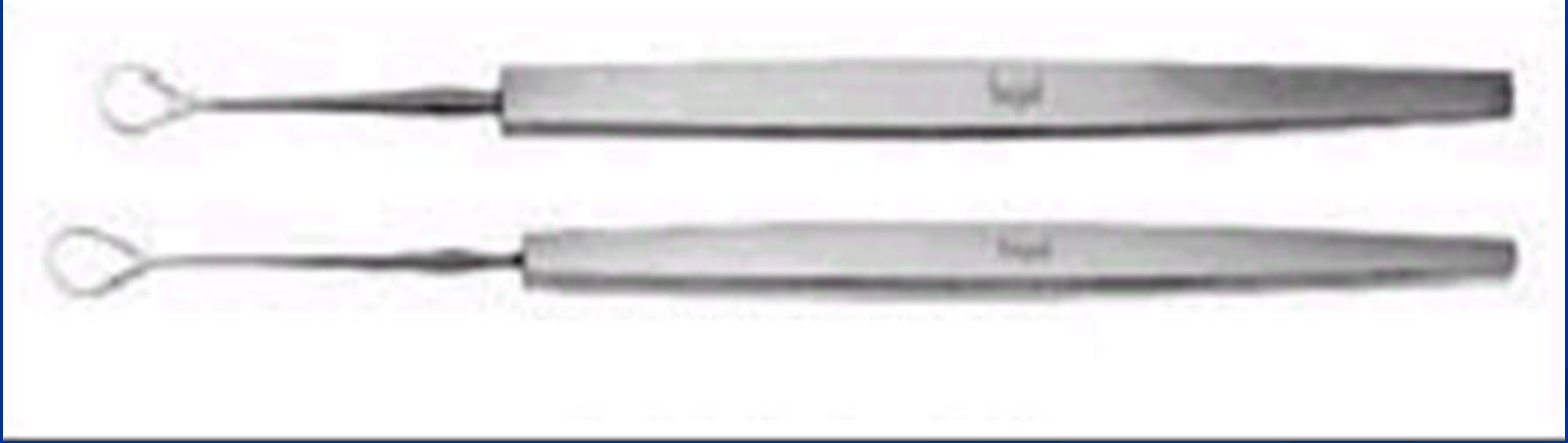


Needle Holders

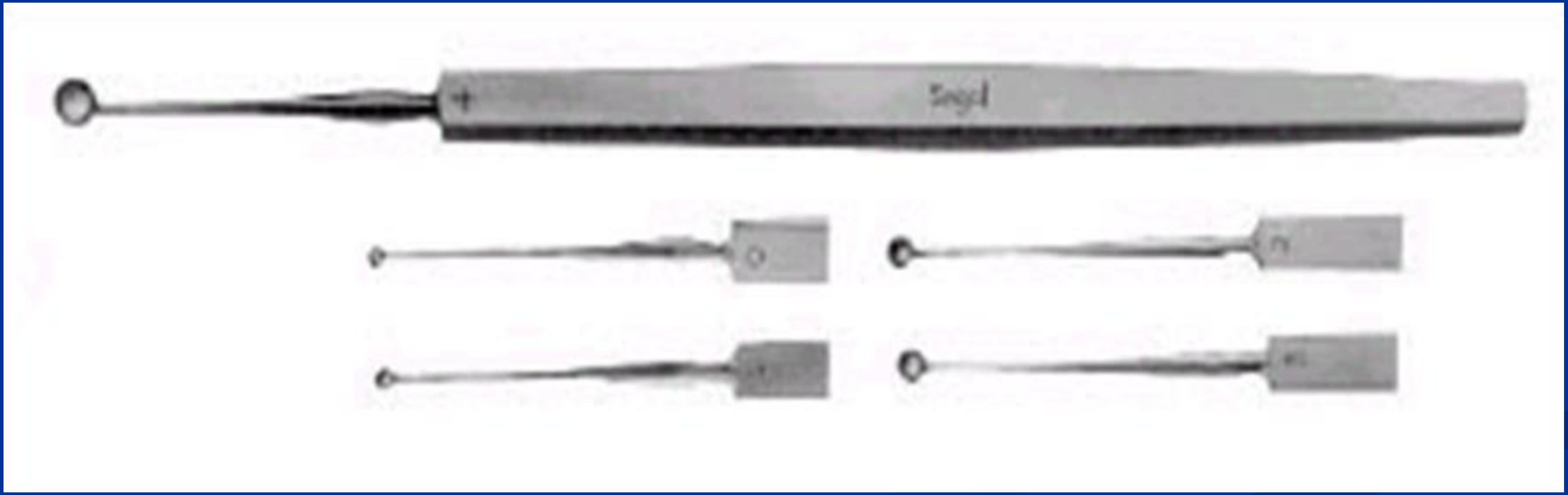


Barraquer Needle Holder

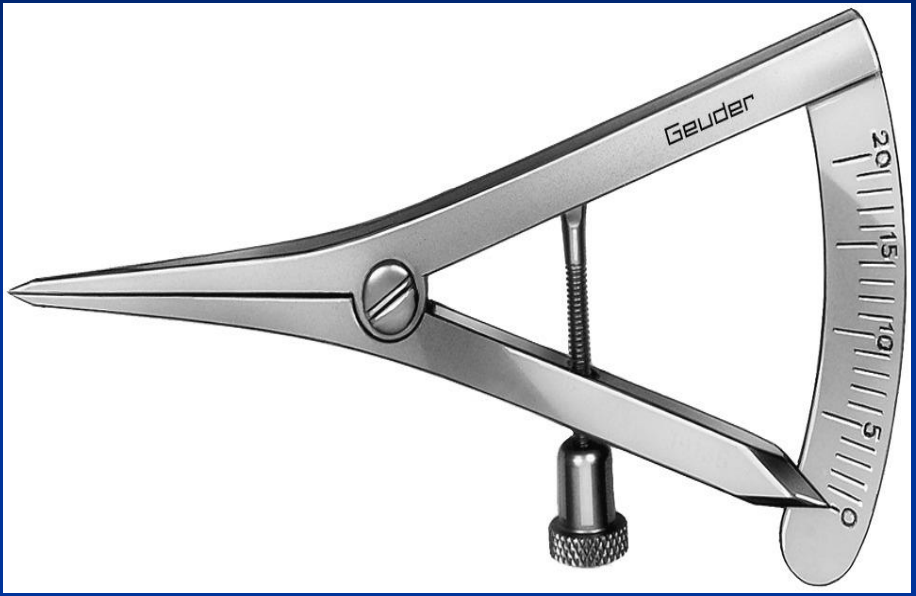
Lens Scoops



Chalazion Scoop



Calipre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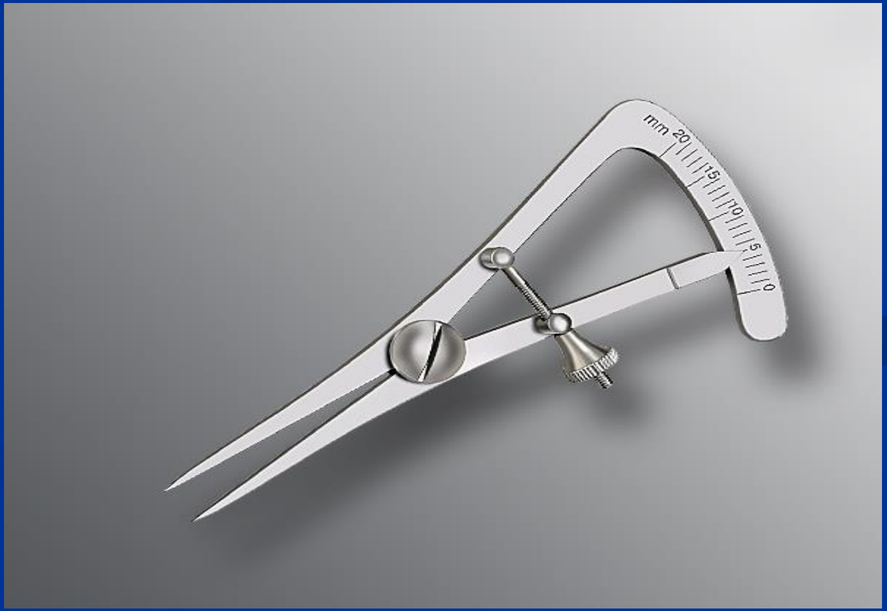
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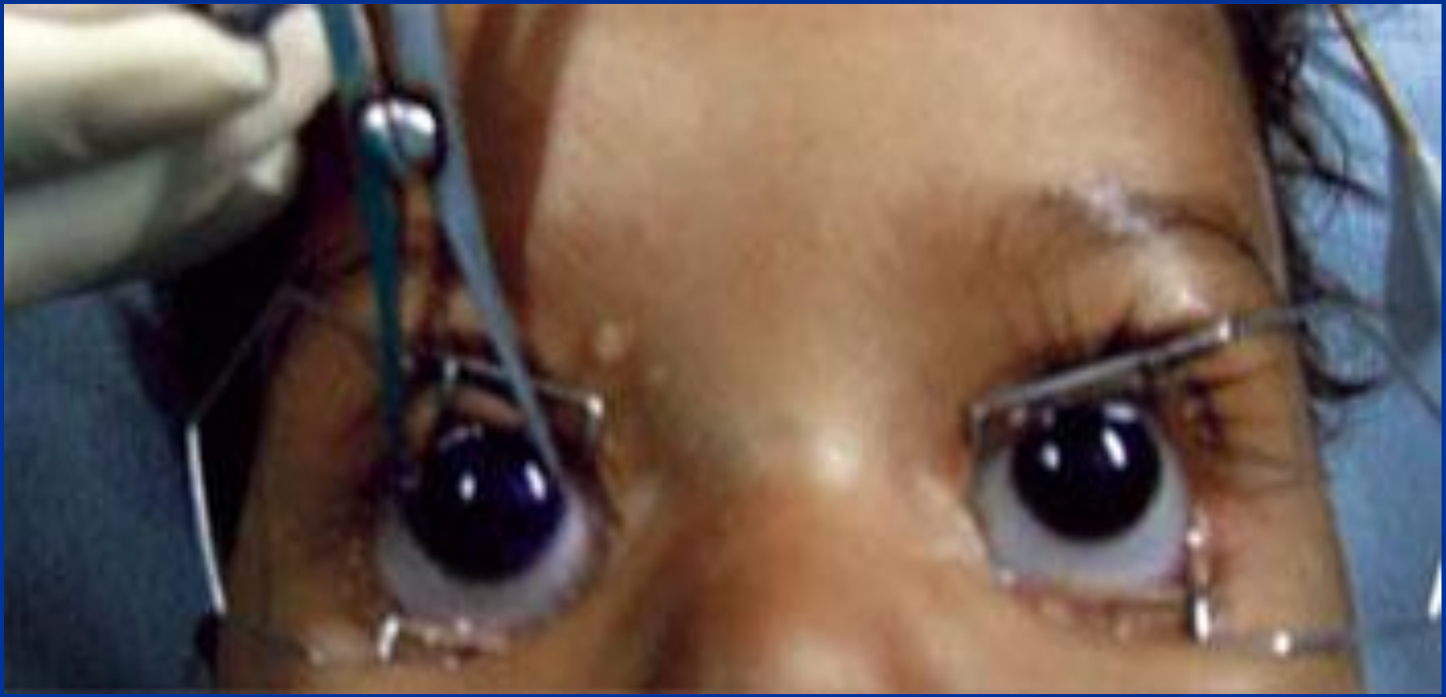
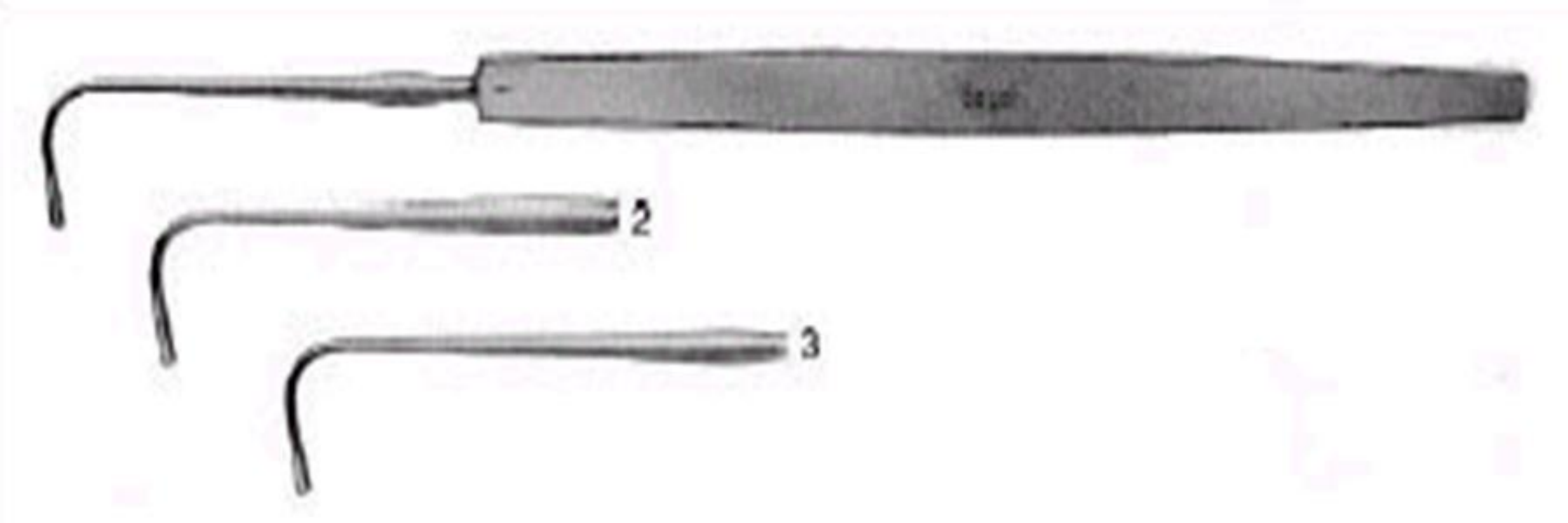
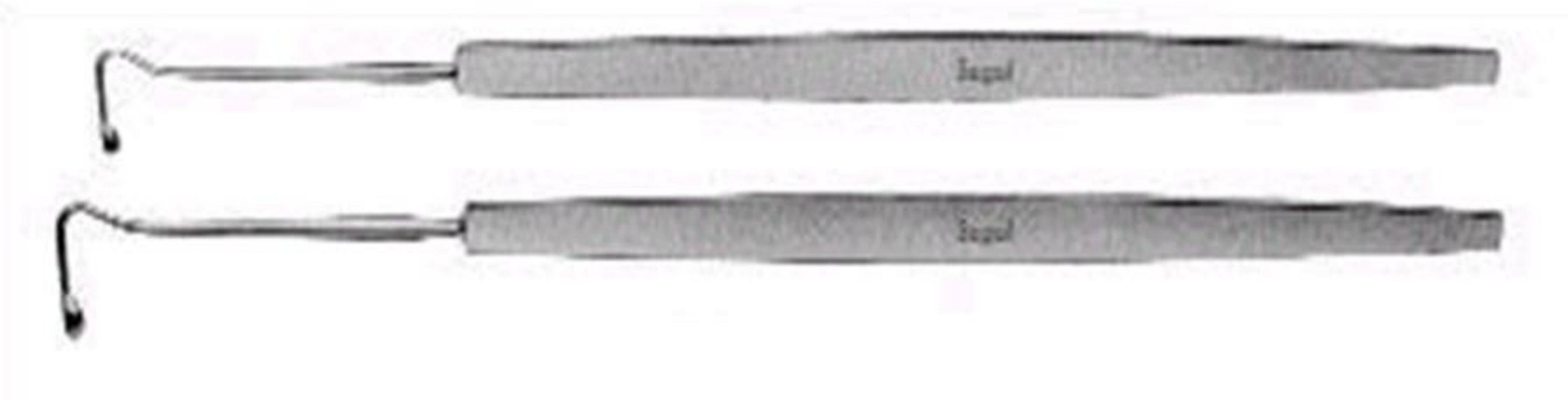
Calipre



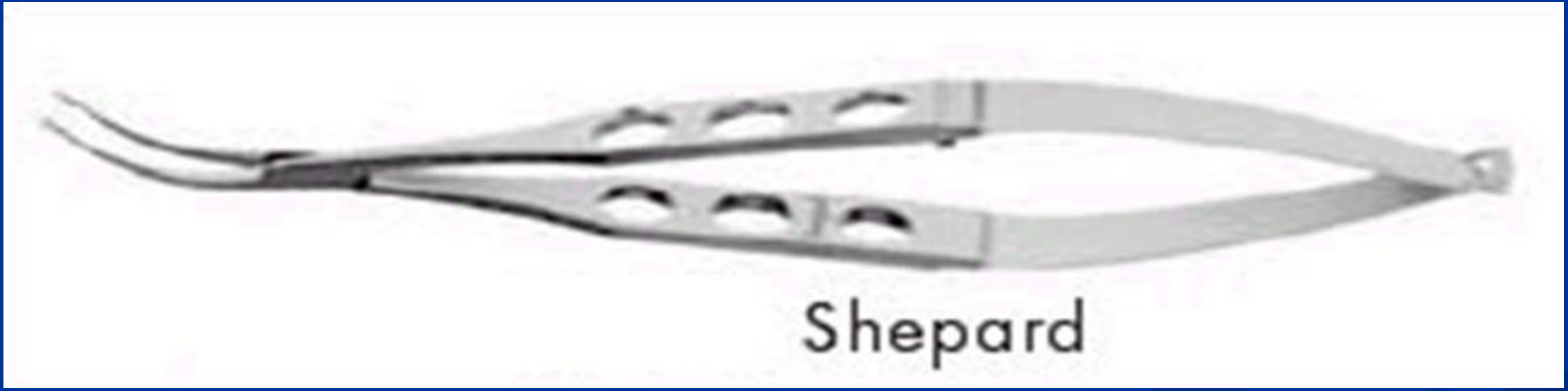
Strabismus Muscle Hook



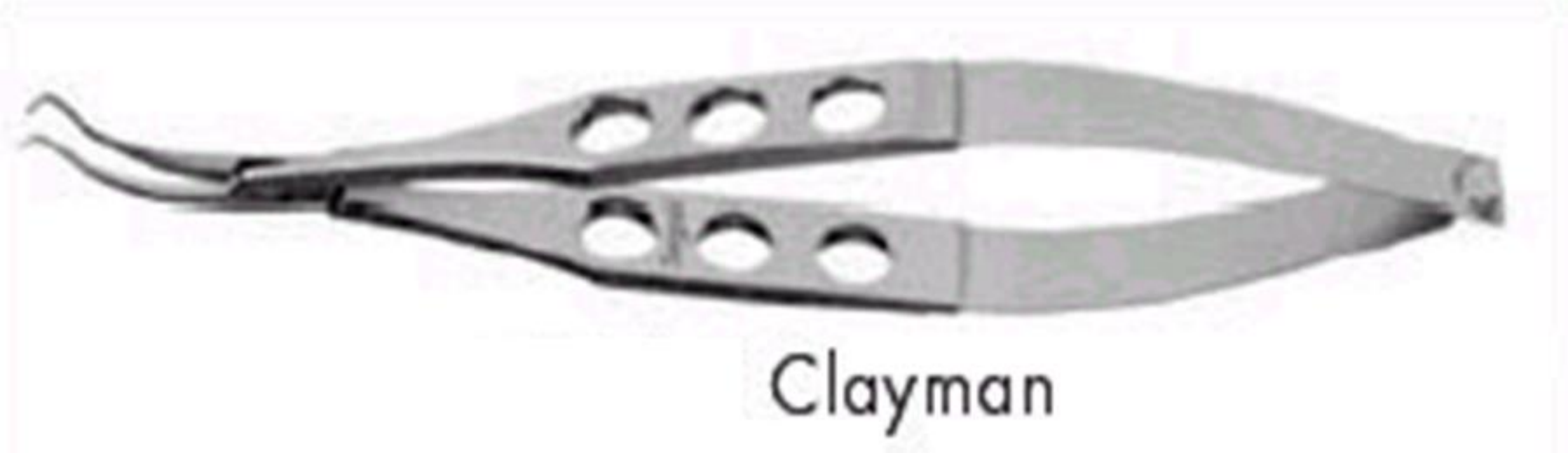
Strabismus Muscle Hook



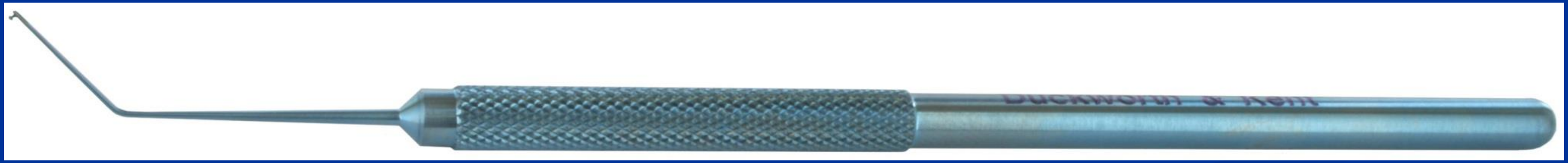
Shepard IOL Inserter



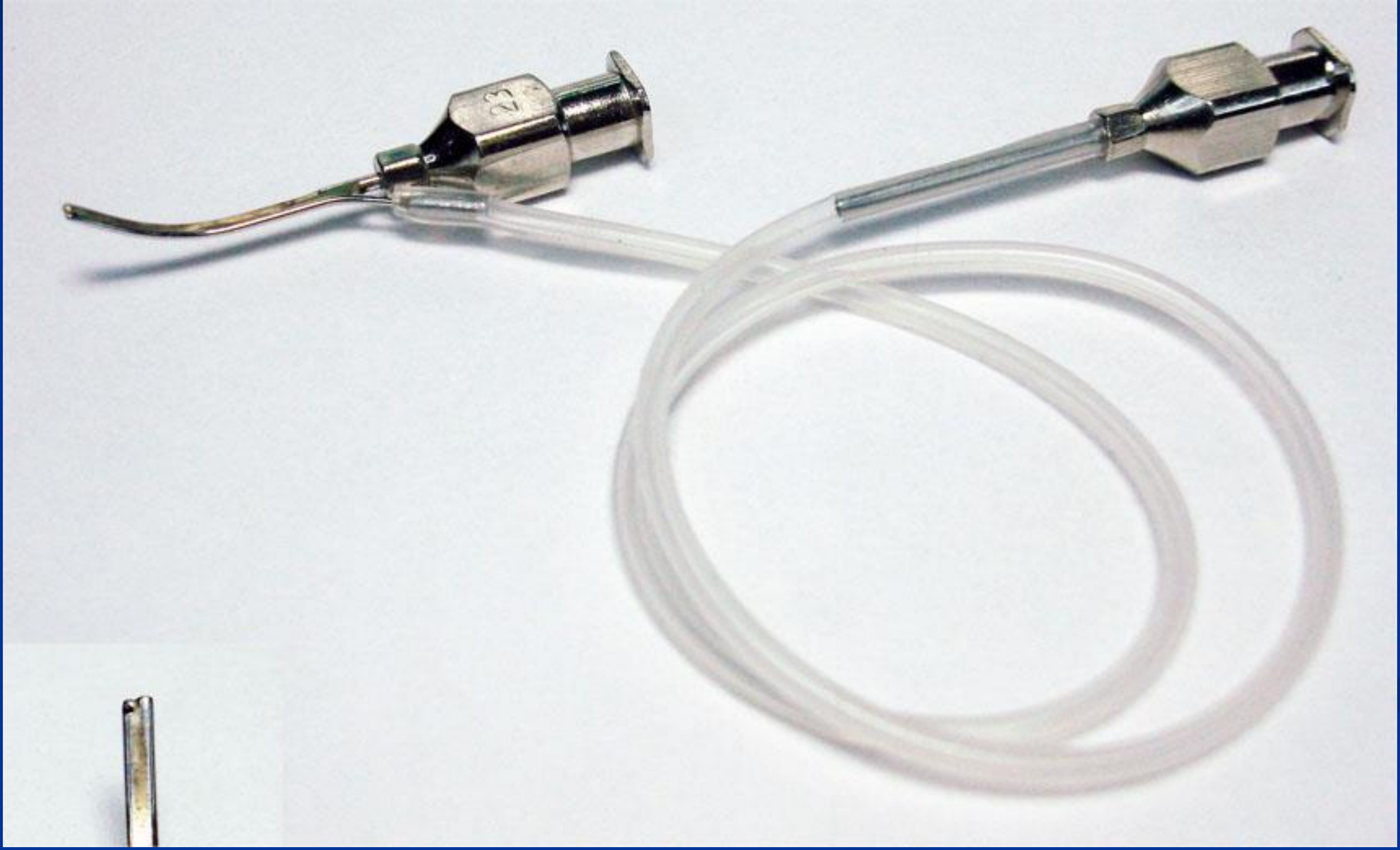
Clayman IOL Forceps



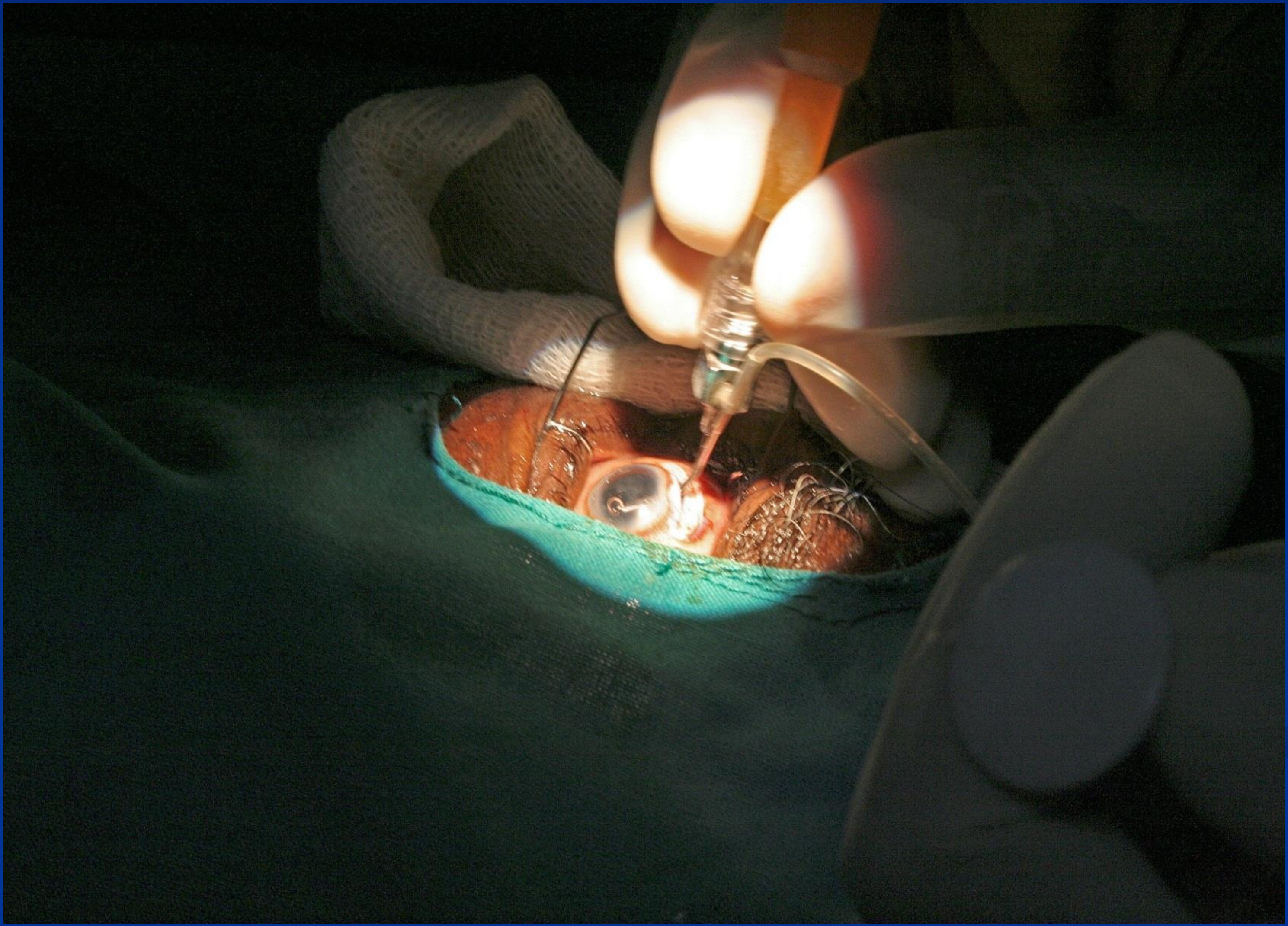
Sinskey IOL Dialer


Duckworth & Kent

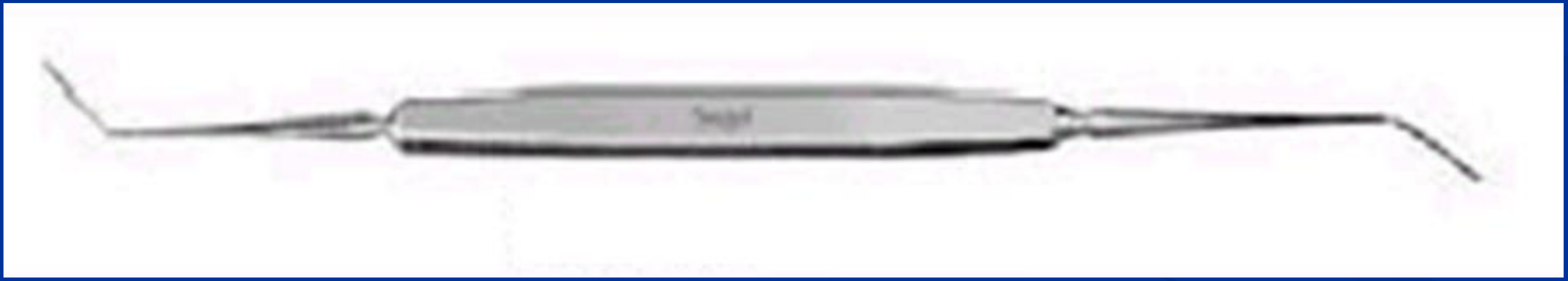
Simcoe Irrigation/Aspiration Cannula



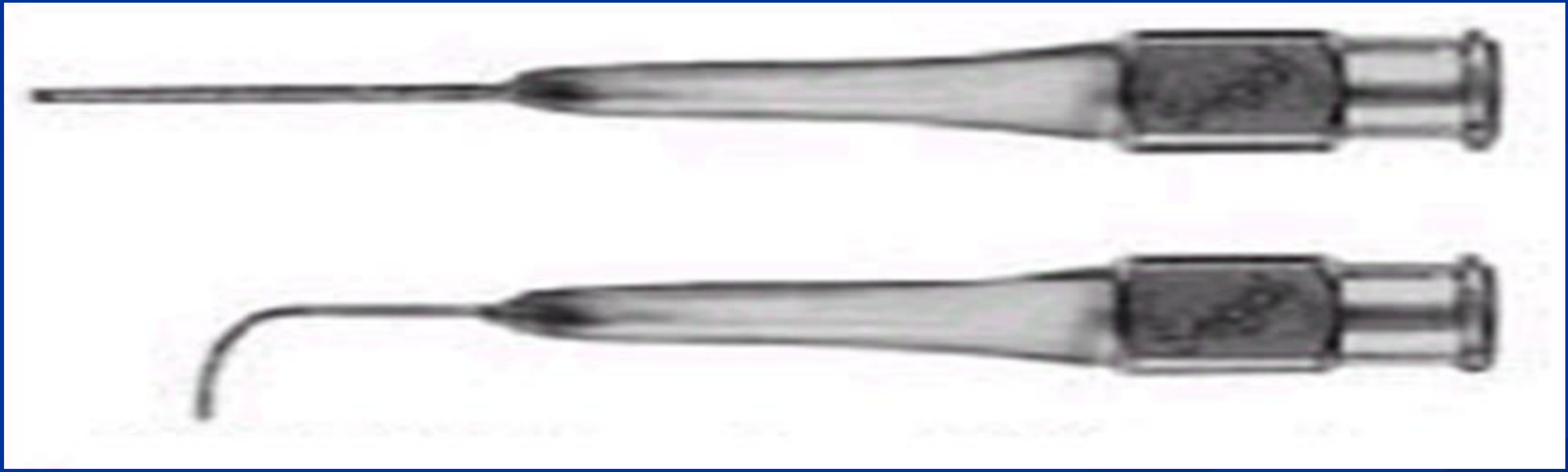
Simcoe Irrigation/Aspiration Cannula



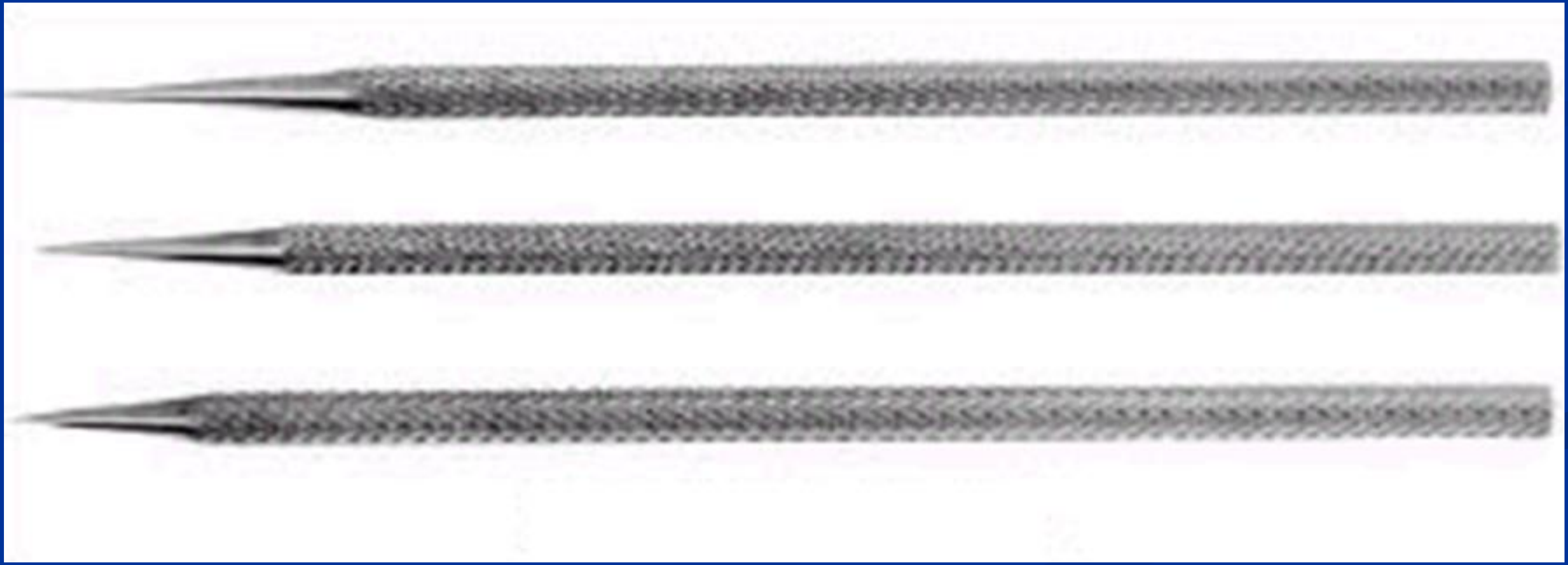
Iris repositor



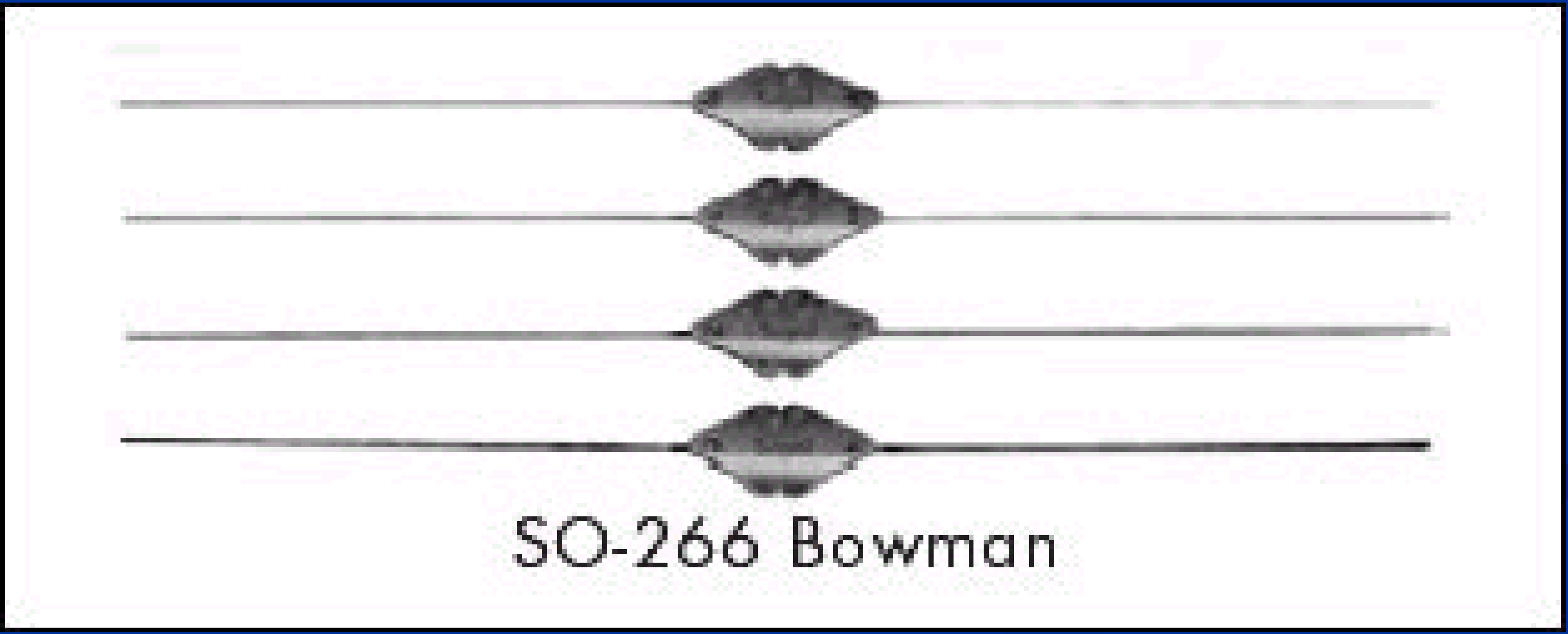
Lacrimal Cannula



Lacrimal Dilators

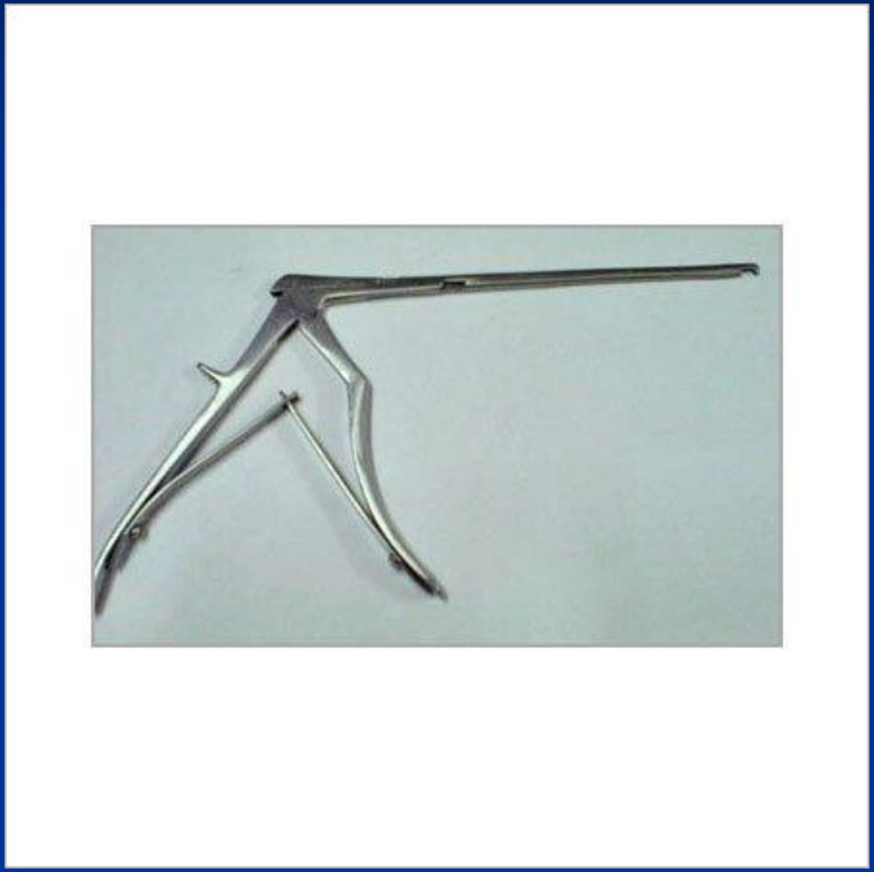


Lacrimal Probes

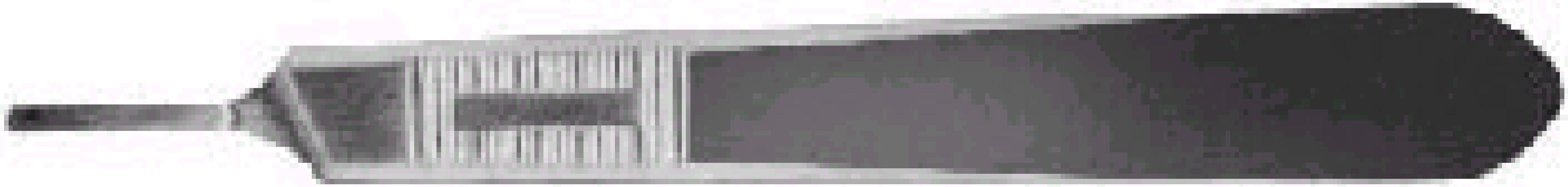


SO-266 Bowman

DCR Punch



Blade Holder

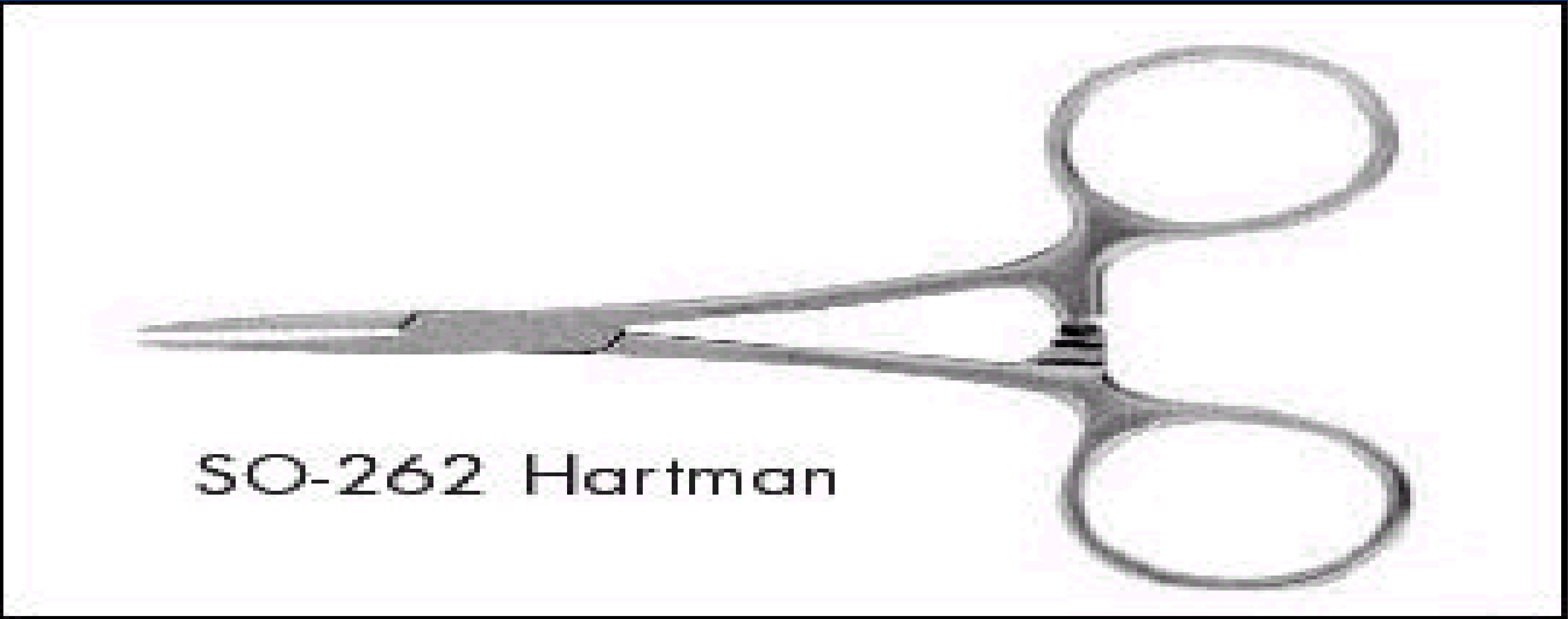


SO-199 Bard Parker Handle

Blade Holder

SO-80 Chuck Handle

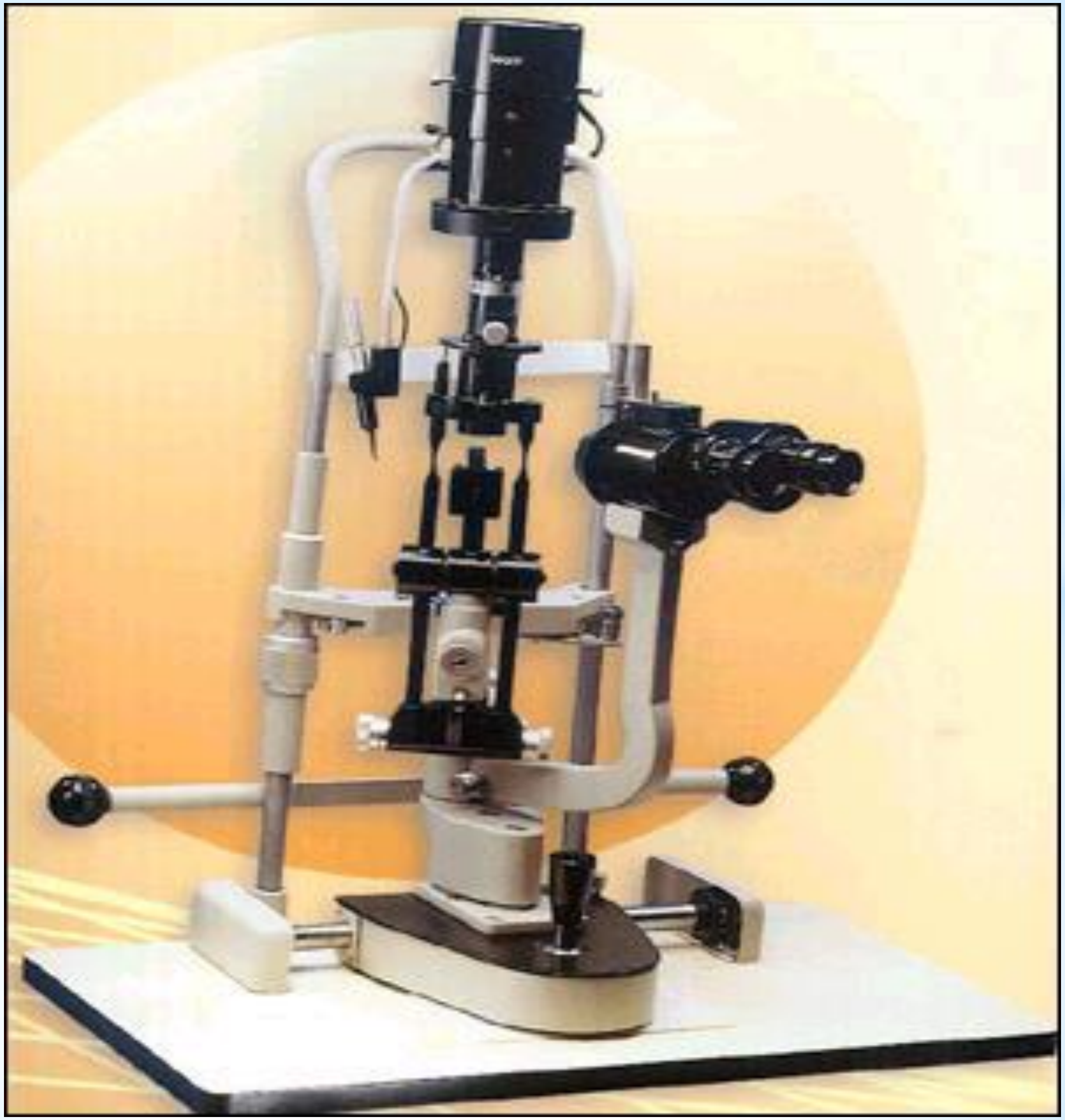
Artery Forceps



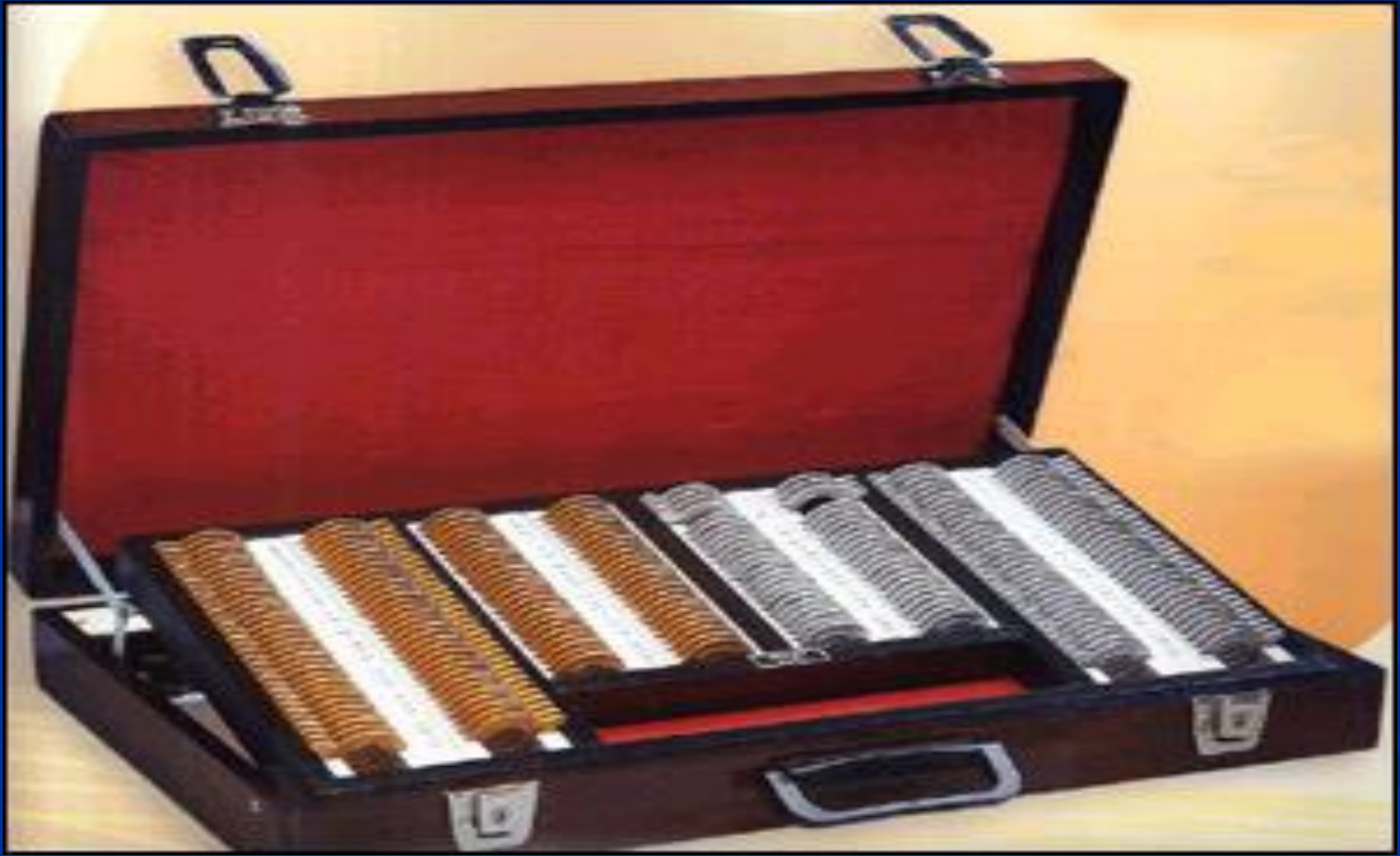
SO-262 Hartman

Clinic Instruments

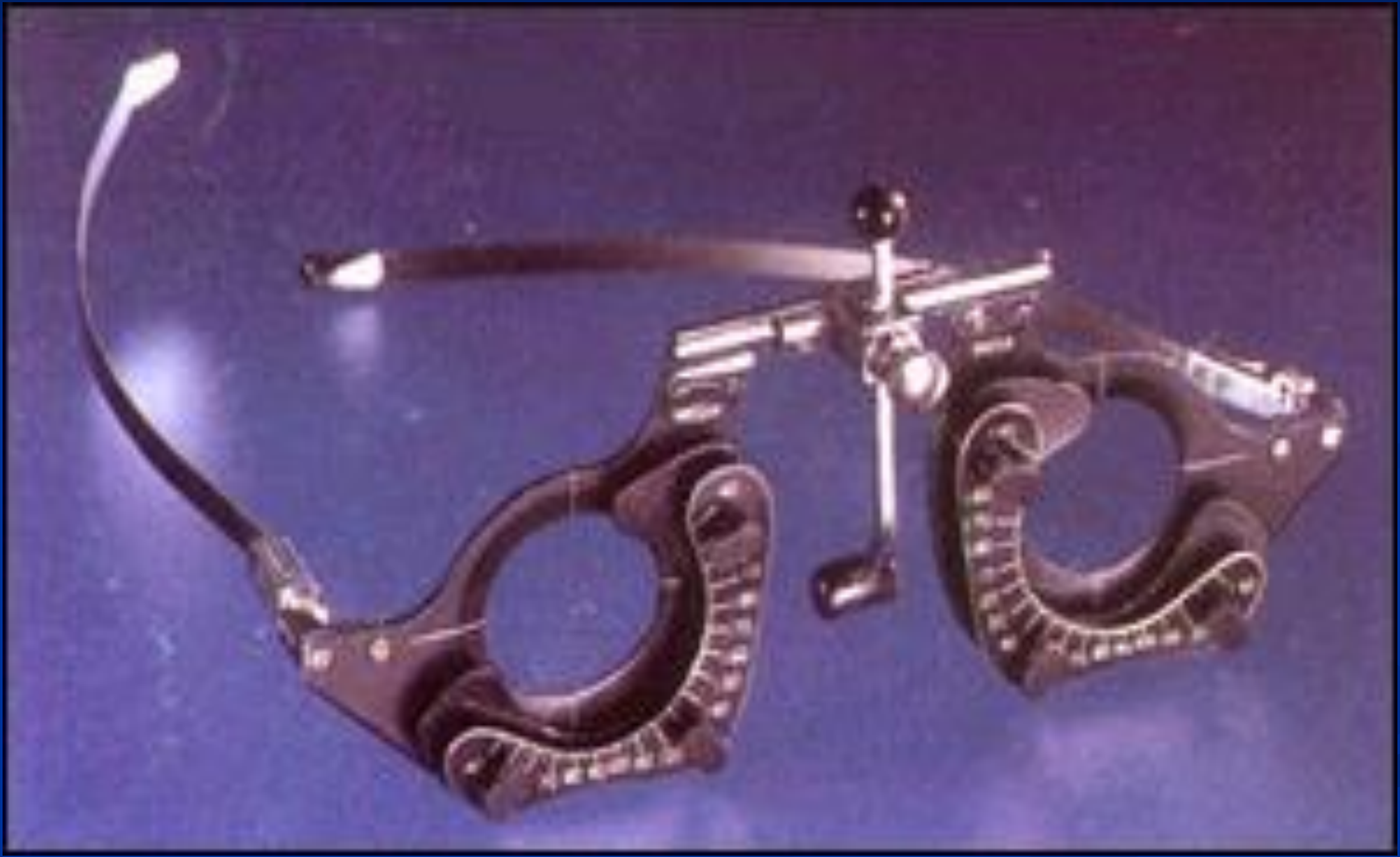
Slitlamp



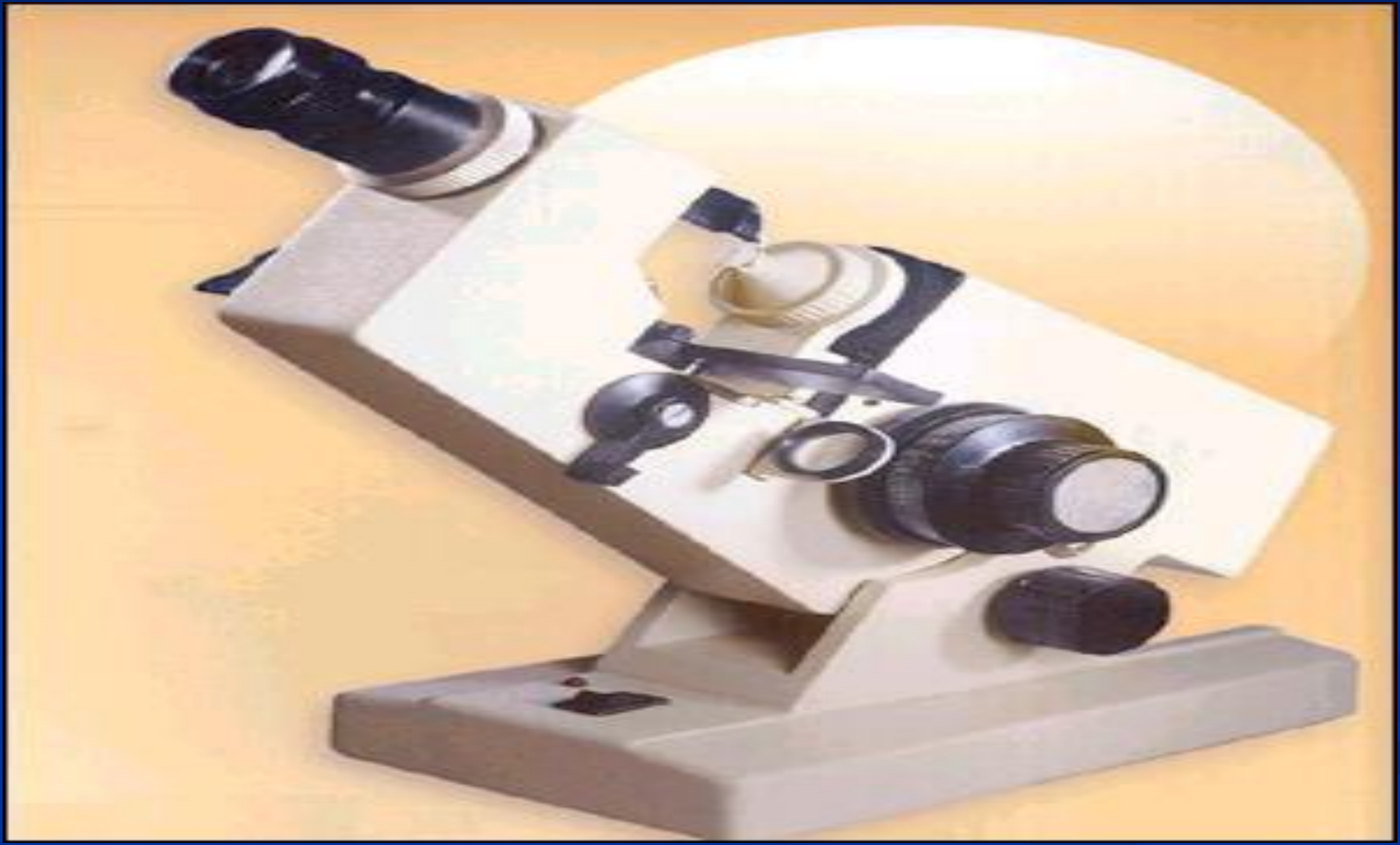
Lens Trial Case



Trial Frame

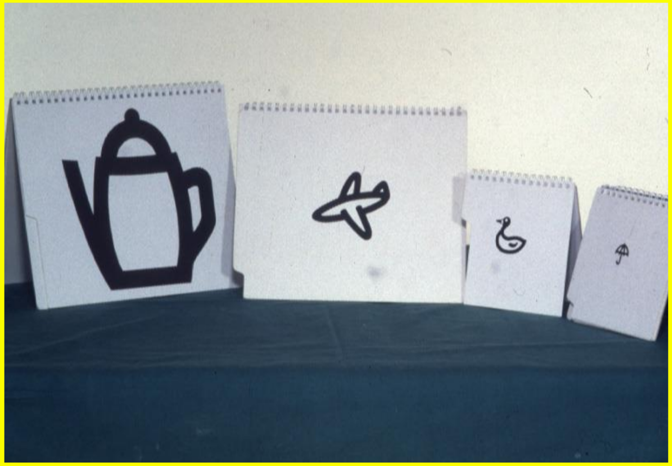


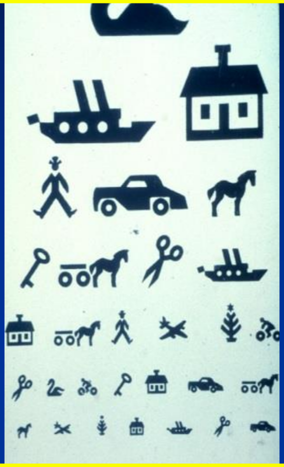
Lensemeter



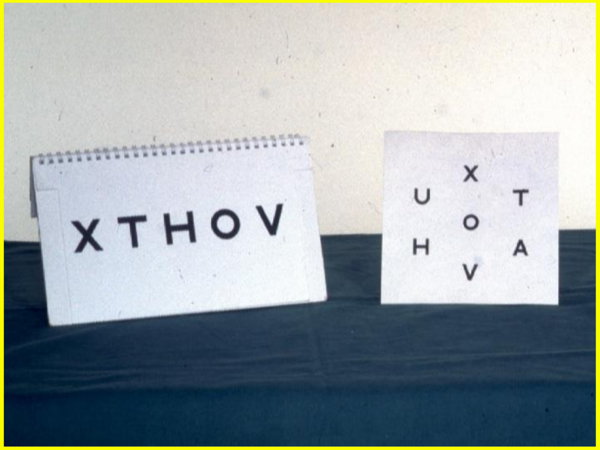
Visual acuity tests in verbal children

At age 2 years (naming pictures)





At age 3 years (matching tests)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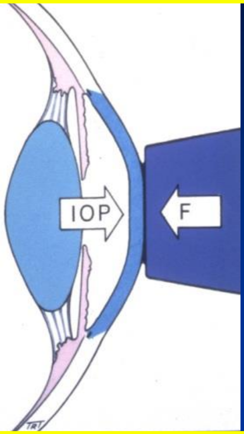
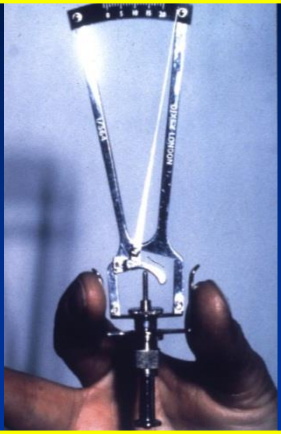


Goldmann

Contact applanation

Perkins

Portable contact applanation



Schiotz

Contact indentation

Air-puff

Non-contact indentation

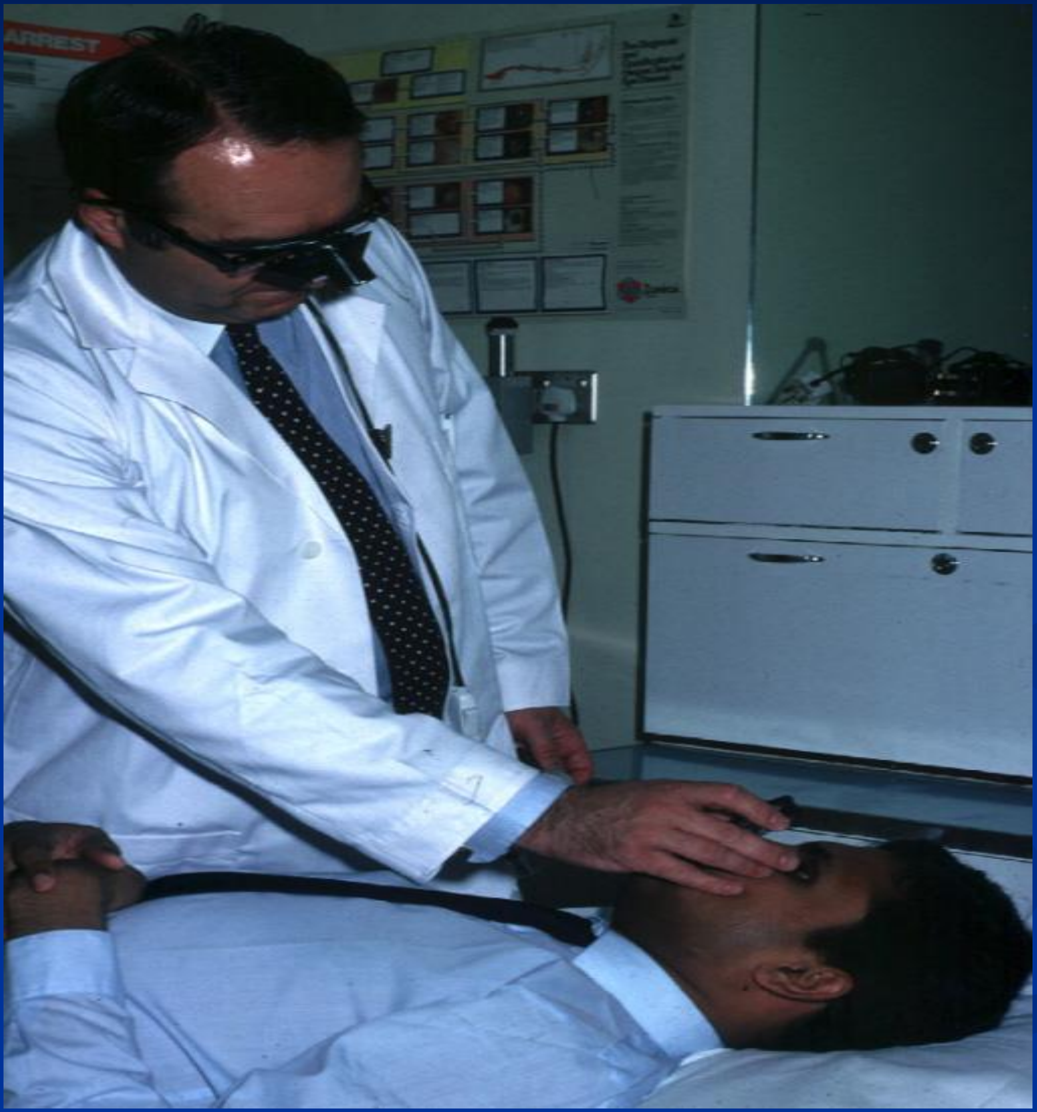
Pulsair 2000 (Keeler)

Portable non-contact applanation

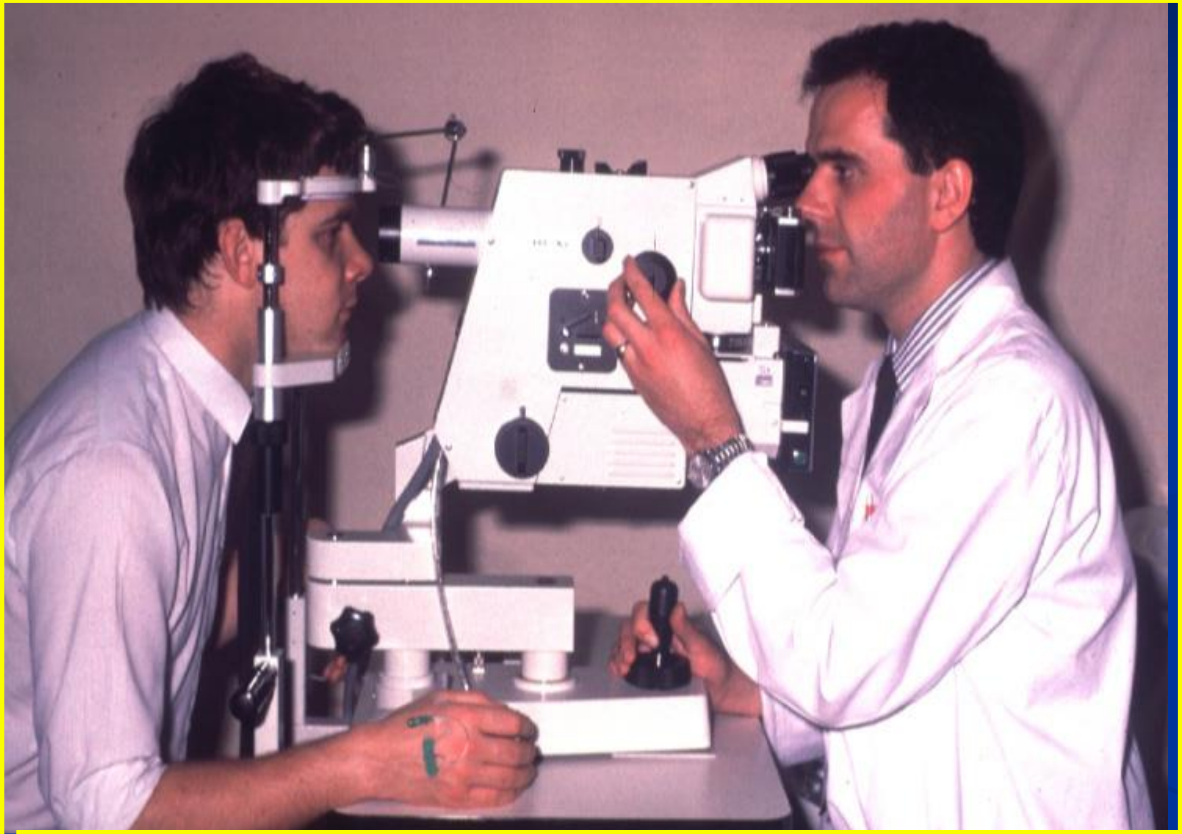
Tono-Pen

Portable contact applanation

Indirect Ophthalmoscopy

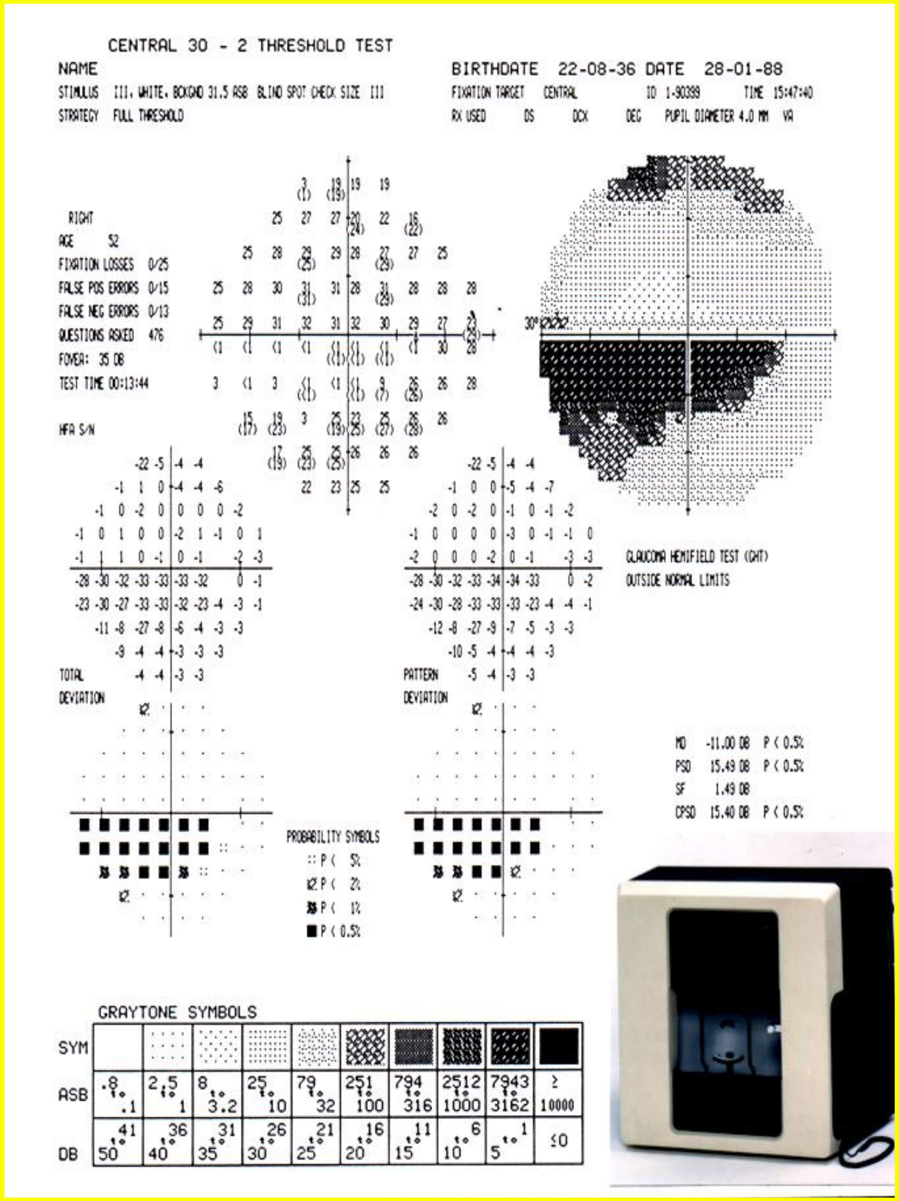


Fundus Photography & Flourescein Angiography



1. Take red-free photograph
2. Inject rapidly 5 ml of 10% solution
3. Take photographs at 1 sec intervals between 5-25 sec after injection

Visual Field Examination



CENTRAL 30 - 2 THRESHOLD TEST

NAME

STIMULUS III, WHITE, BCKGND 31.5 ASB BLIND SPOT CHECK SIZE III

STRATEGY FULL THRESHOLD

BIRTHDATE 22-08-36 DATE 28-01-88

FIXATION TARGET CENTRAL ID 1-90399 TIME 15:47:40

RX USED DS DCX DEG PUPIL DIAMETER 4.0 MM VA

RIGHT

AGE 52

FIXATION LOSSES 0/25

FALSE POS ERRORS 0/15

FALSE NEG ERRORS 0/13

QUESTIONS ASKED 476

FOVEA: 35 DB

TEST TIME 00:13:44

HFA S/N

TOTAL DEVIATION

PATTERN DEVIATION

GLAUCOMA HEMIFIELD TEST (GHT)
OUTSIDE NORMAL LIMITS

MD -11.00 DB P < 0.5%

PSD 15.49 DB P < 0.5%

SF 1.49 DB

CPSD 15.40 DB P < 0.5%

PROBABILITY SYMBOLS

⁚⁚ P < 5%

▨ P < 2%

▩ P < 1%

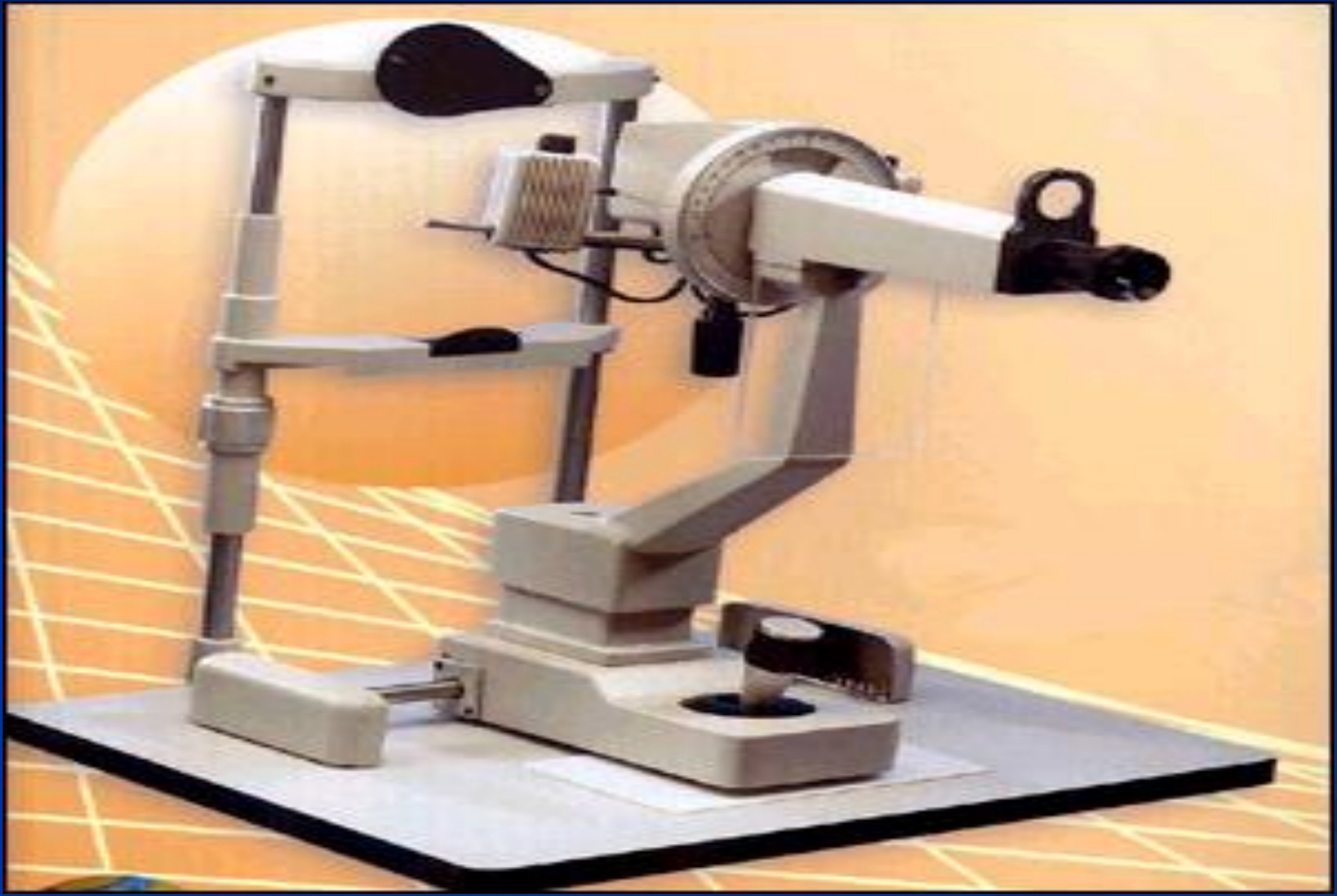
■ P < 0.5%

GRAYTONE SYMBOLS

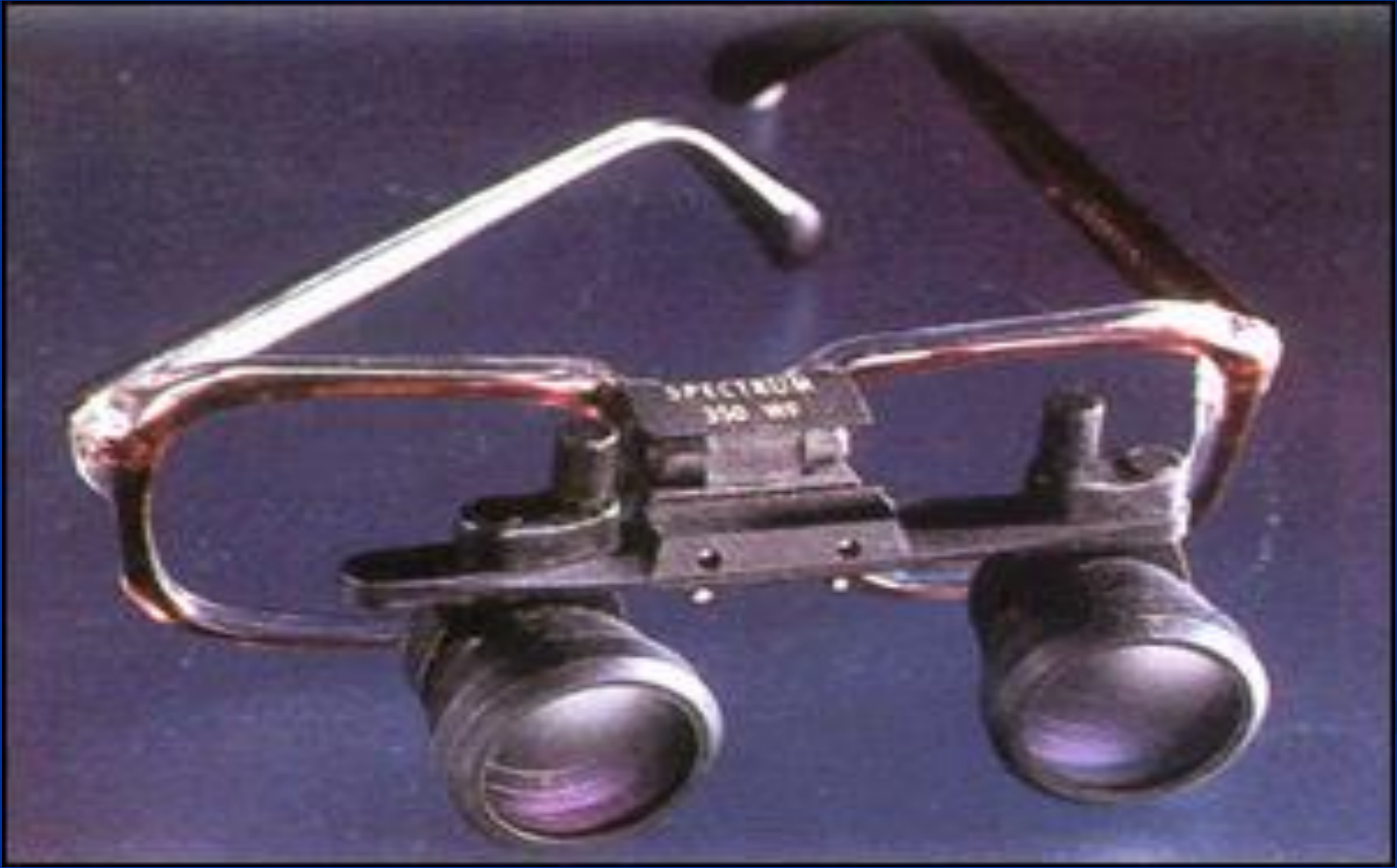
SYM		⁚	⁛	░	▒	▨	▤	▩	▦	■
ASB	.8 to .1	2.5 to 1	8 to 3.2	25 to 10	79 to 32	251 to 100	794 to 316	2512 to 1000	7943 to 3162	≥ 10000
DB	41 to 50	36 to 40	31 to 35	26 to 30	21 to 25	16 to 20	11 to 15	6 to 10	1 to 5	≤0

Humphrey Perimetry

Keratometer



Surgical Loop

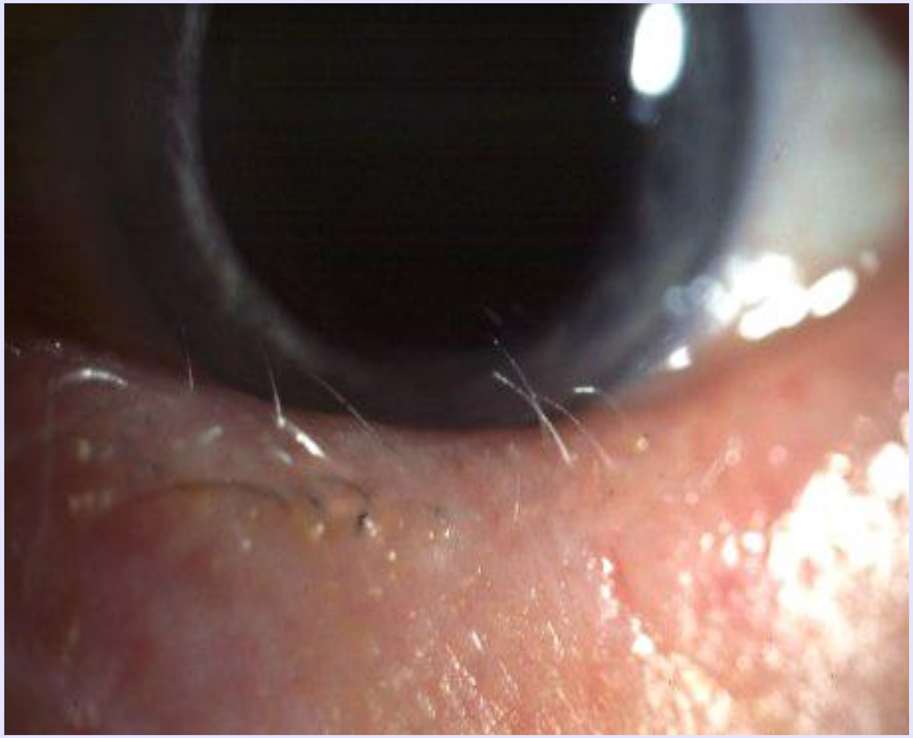
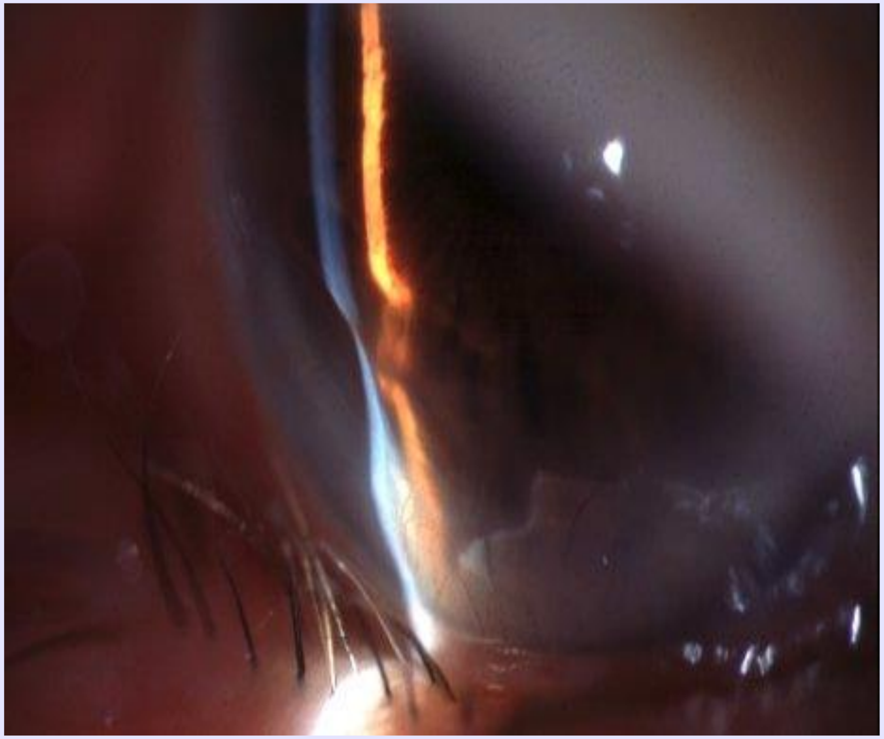


EYELIDS

DISORDERS OF LASHES

1. **Trichiasis**
2. **Distichiasis**
3. **Madarosis**
4. **Poliosis**

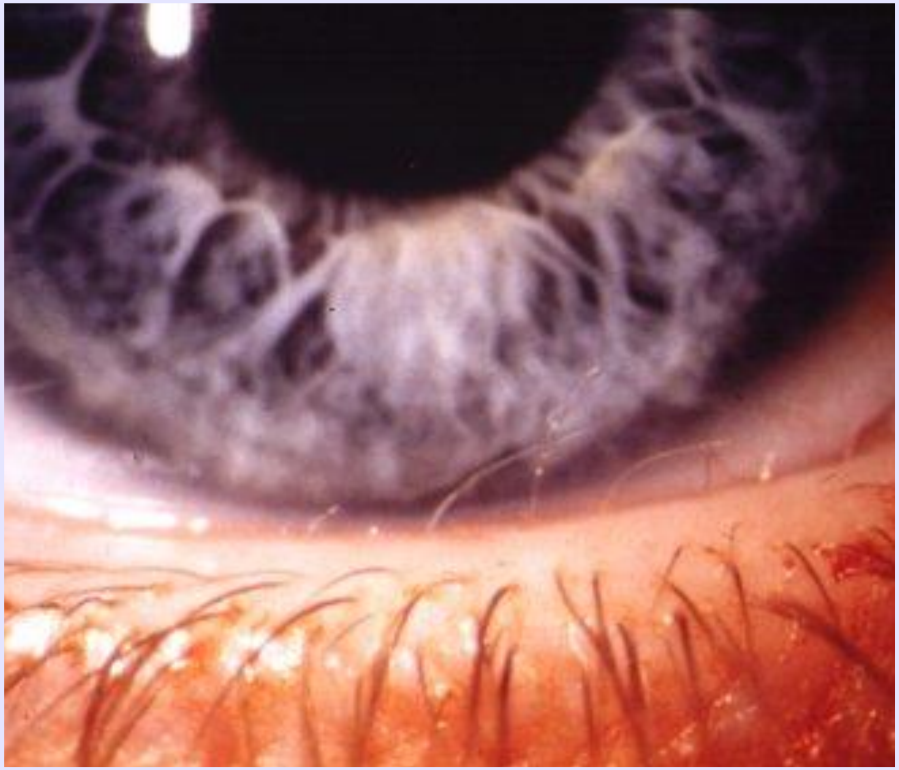
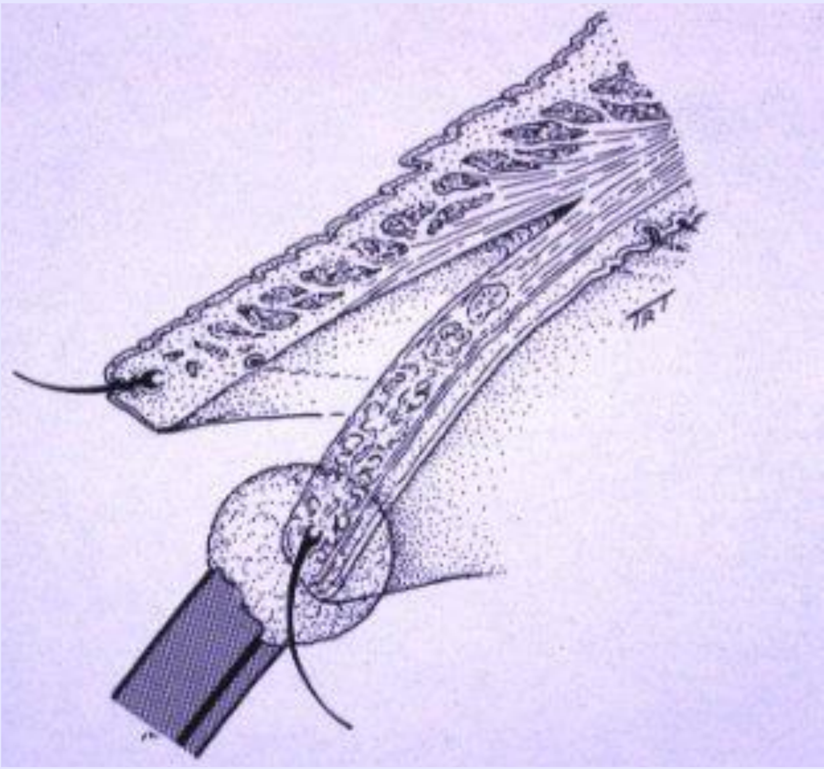
Trichiasis

Signs	Complications
	
• Posterior misdirection of normal lashes • Most frequently affects lower lid	• Inferior punctate epitheliopathy • Corneal ulceration and pannus

Treatment Options for Trichiasis

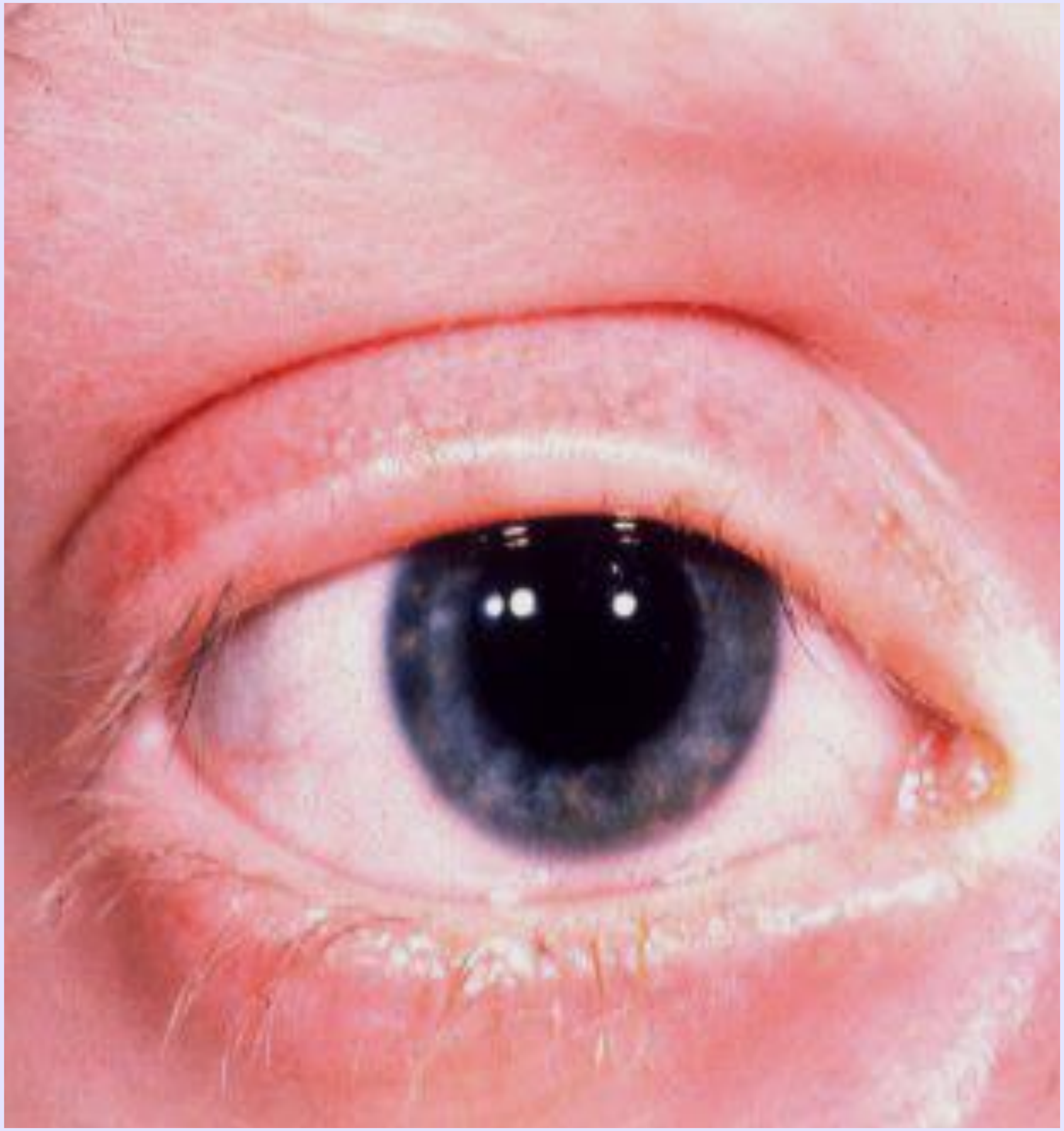
1. Epilation - but recurrences within few weeks
2. Electrolysis - but frequently repeated treatments required
3. Cryotherapy - for many lashes
4. Laser ablation - for few scattered lashes
5. Surgery - for localized crop resistant to other methods

Distichiasis

Signs	Treatment
	
• Second row of lashes arising from meibomian gland orifices • Congenital • Occasionally dominantly inherited	• Division into anterior and posterior lamellae • Cryotherapy to posterior lamella • Reapposition of lamellae

Madarosis

Decrease in number or complete loss of lashes



Local causes

- Chronic anterior lid margin disease
- Infiltrating tumours
- Burns, radiotherapy or cryotherapy

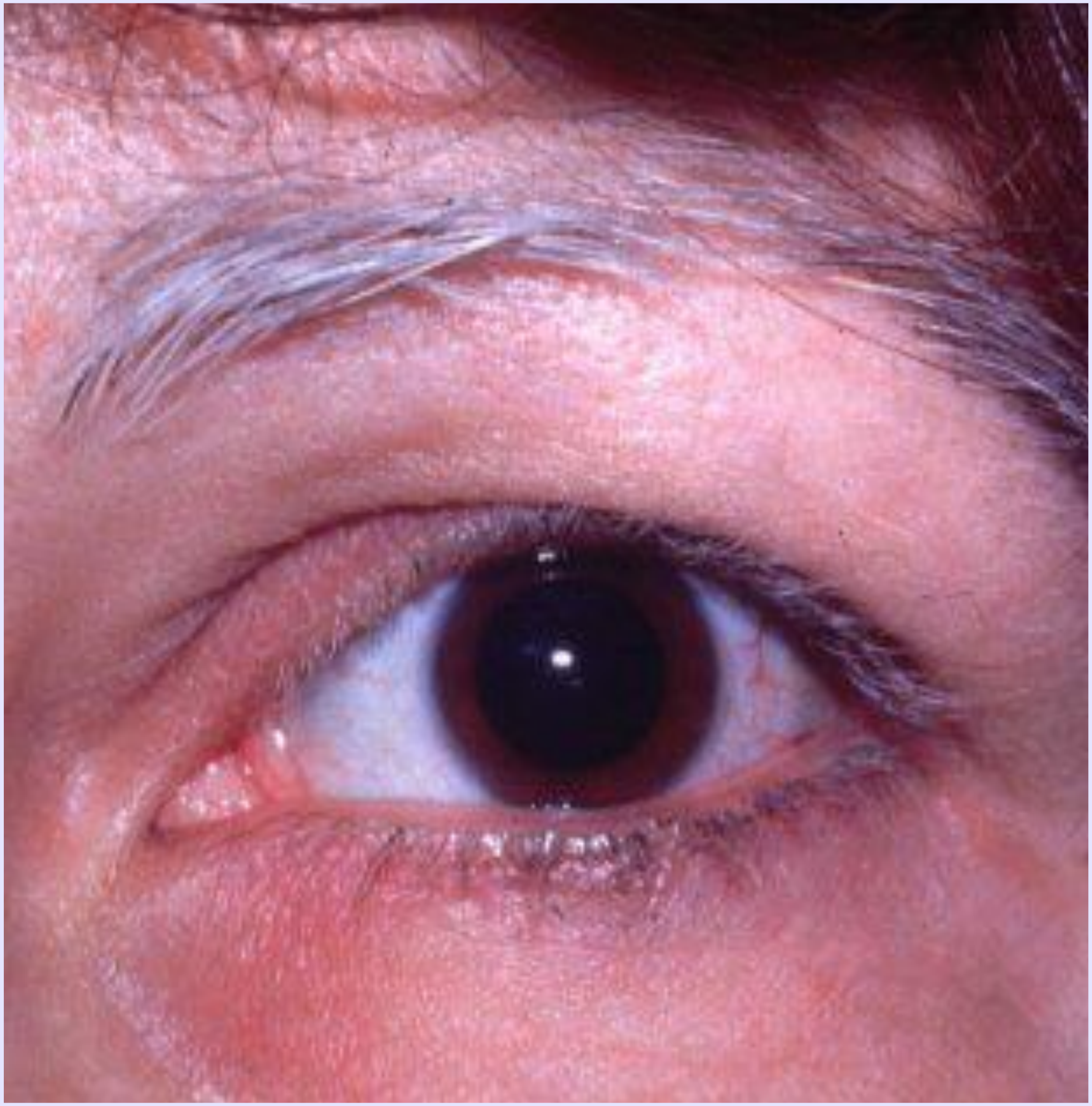
Systemic causes

- Generalized alopecia
- Myxoedema
- SLE
- Syphilis
- Leprosy

Following removal

Poliosis

Premature localized whitening of hair



Ocular associations

- Chronic anterior blepharitis
- Sympathetic ophthalmitis

Systemic associations

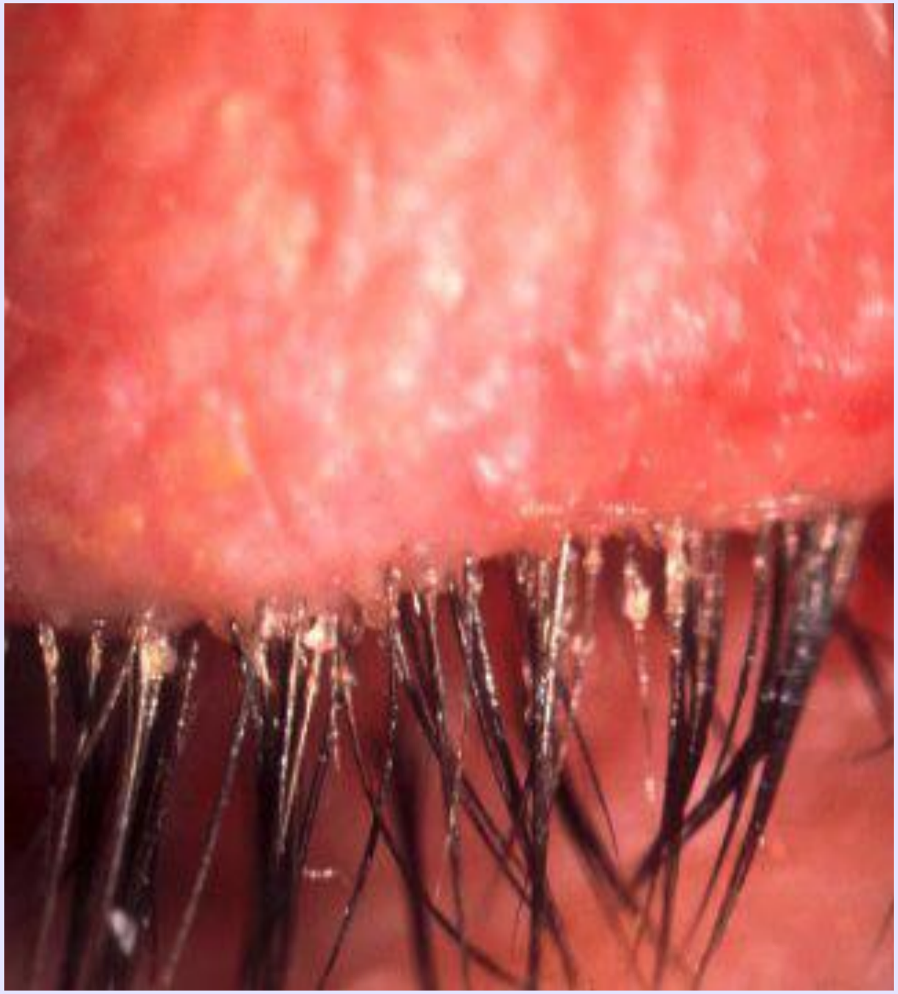
- Vogt-Koyanagi-Harada syndrome
- Waardenburg syndrome

CHRONIC MARGINAL BLEPHARITIS

1. **Anterior**
   - Staphylococcal
   - Seborrhoeic

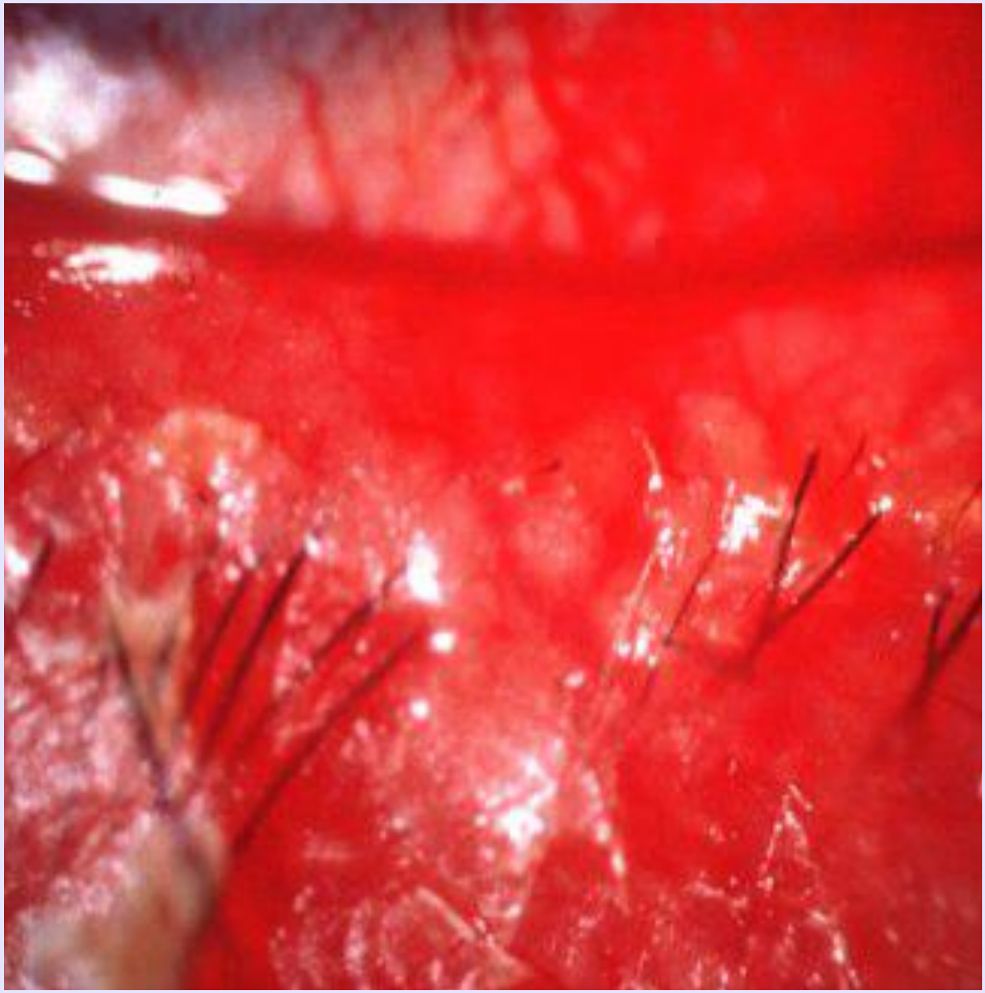
2. **Posterior**
   - Meibomianitis
   - Meibomian seborrhoea

Staphylococcal blepharitis



Chronic irritation worse in mornings

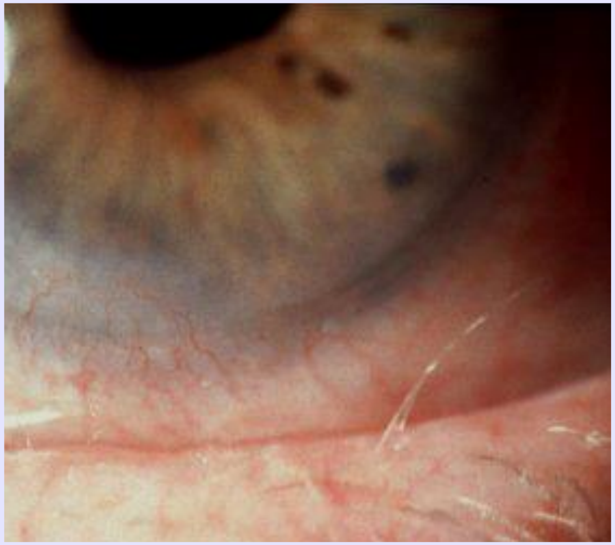
Scales around base of lashes (collarettes)



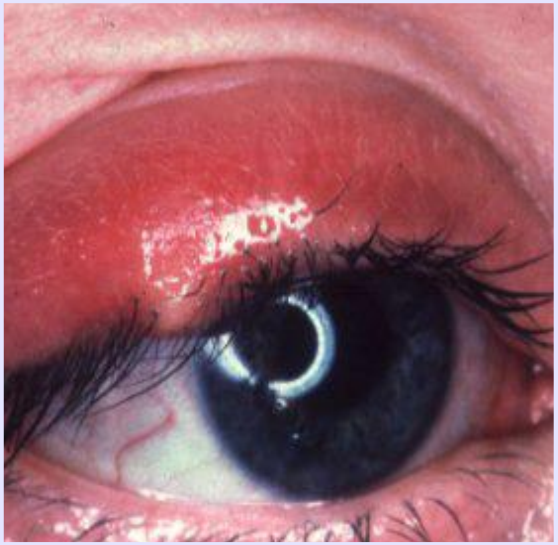
Hyperaemia and telangiectasia of anterior lid margin

Scarring and hypertrophy if longstanding

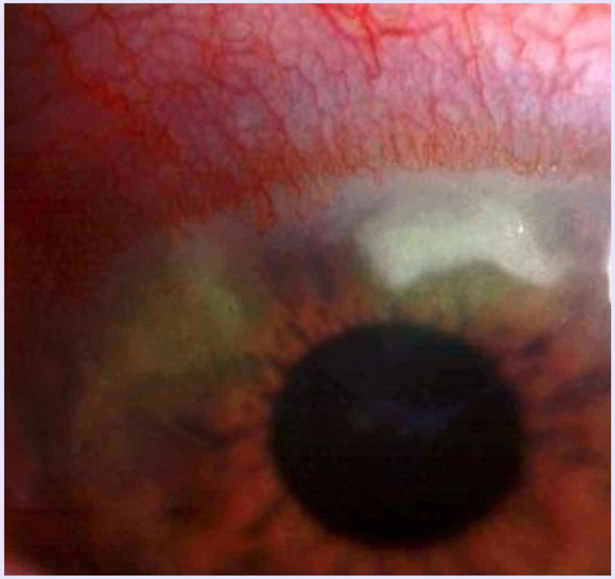
Complications of staphylococcal blepharitis



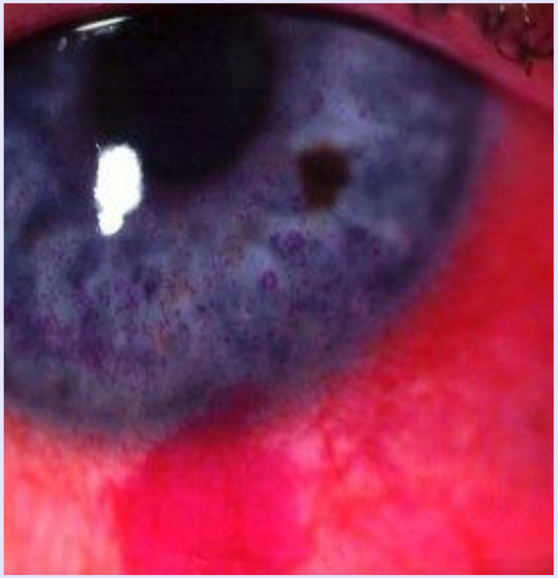
Madarosi, Poliosis, Trichiasis



Recurrent styes

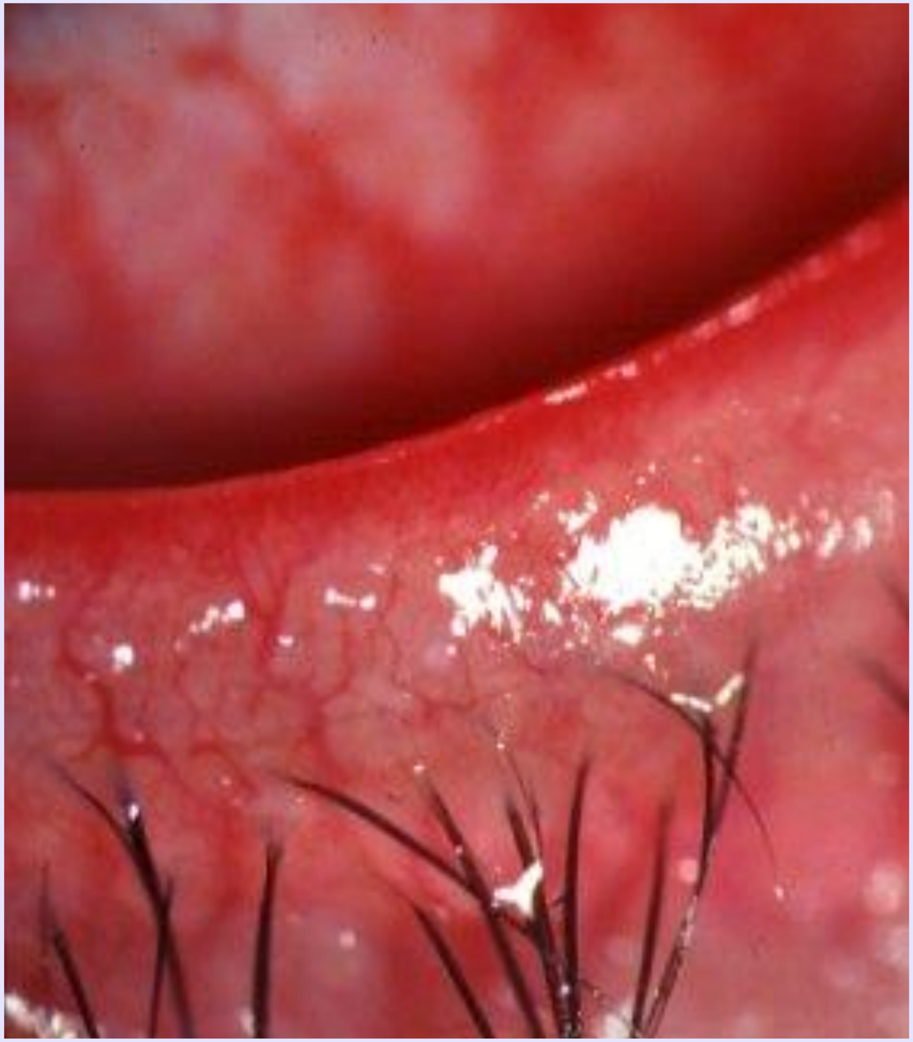


Marginal keratitis

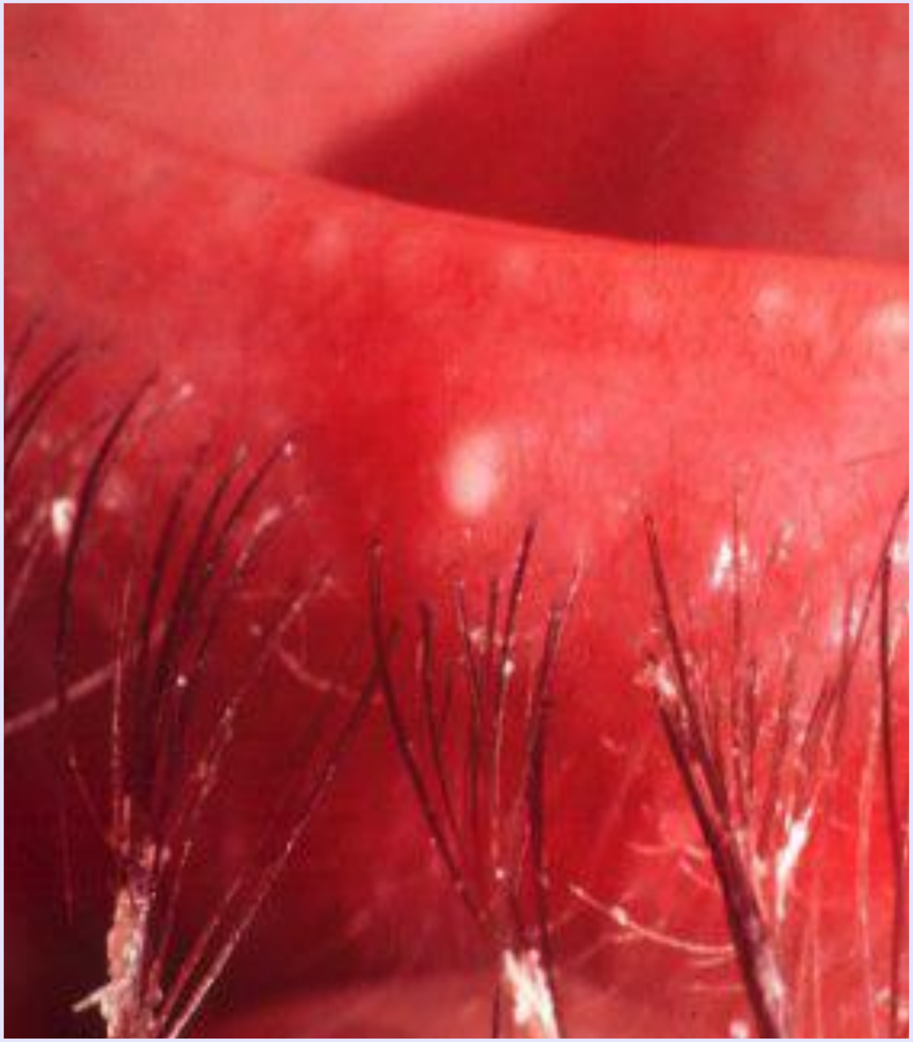


Tear film instability

Seborrhoeic blepharitis

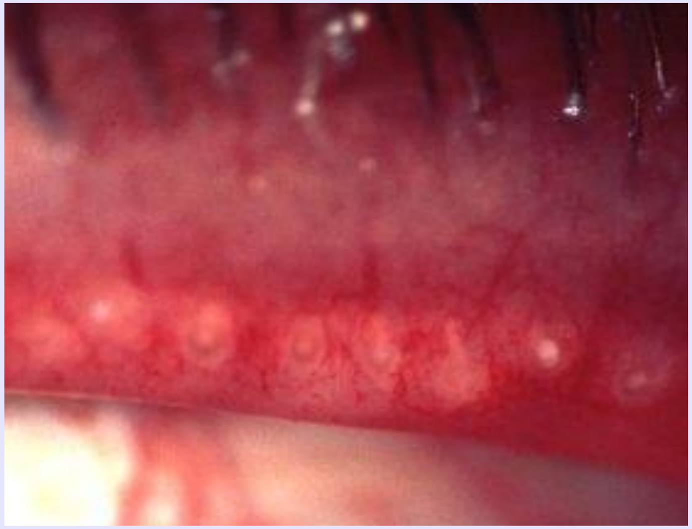


- Shiny anterior lid margin
- Hyperaemia of lid margin

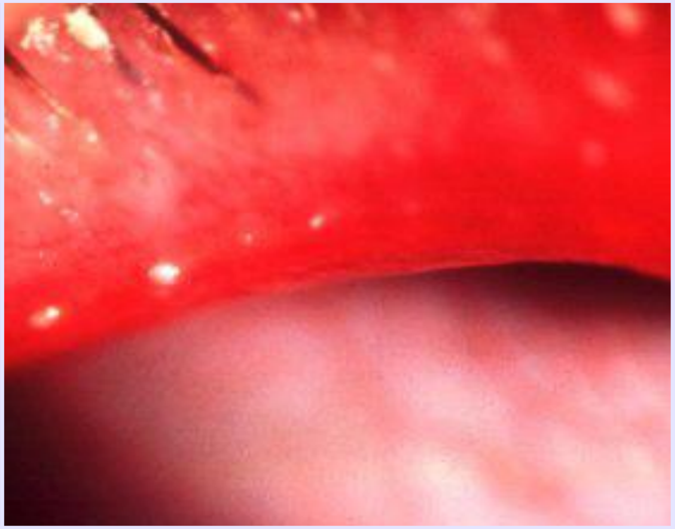


- Greasy scales
- Lashes stuck together

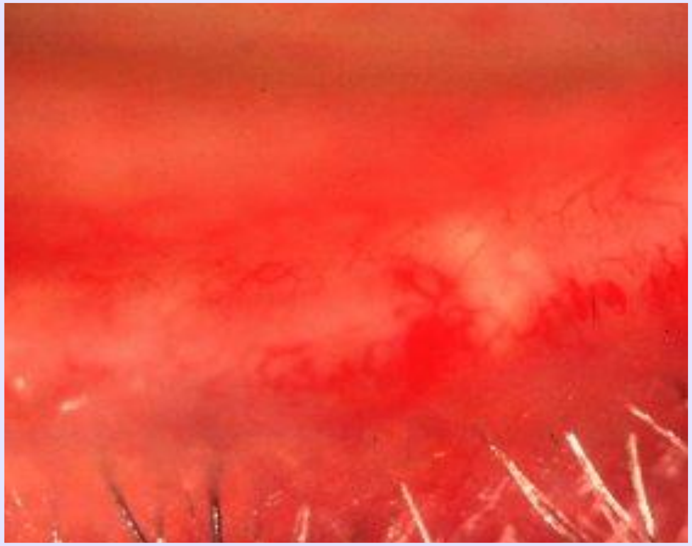
Meibomianitis



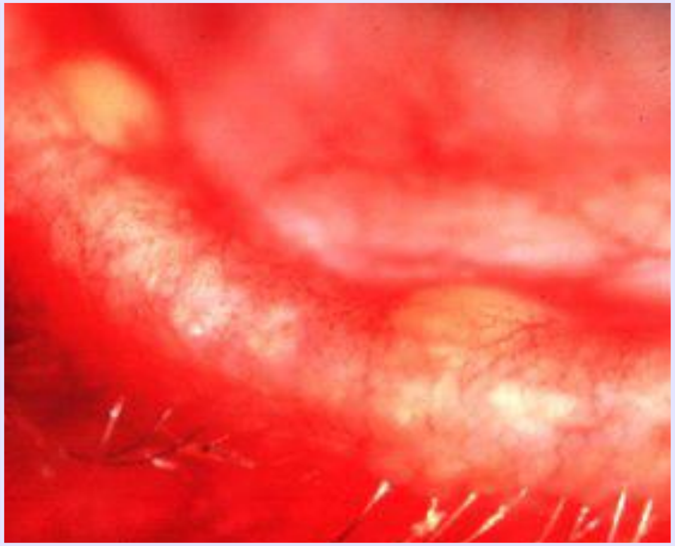
Inflamed and blocked meibomian gland orifices



Toothpaste-like plaques from meibomian glands



Thickened posterior lid margin



Meibomian cyst formation

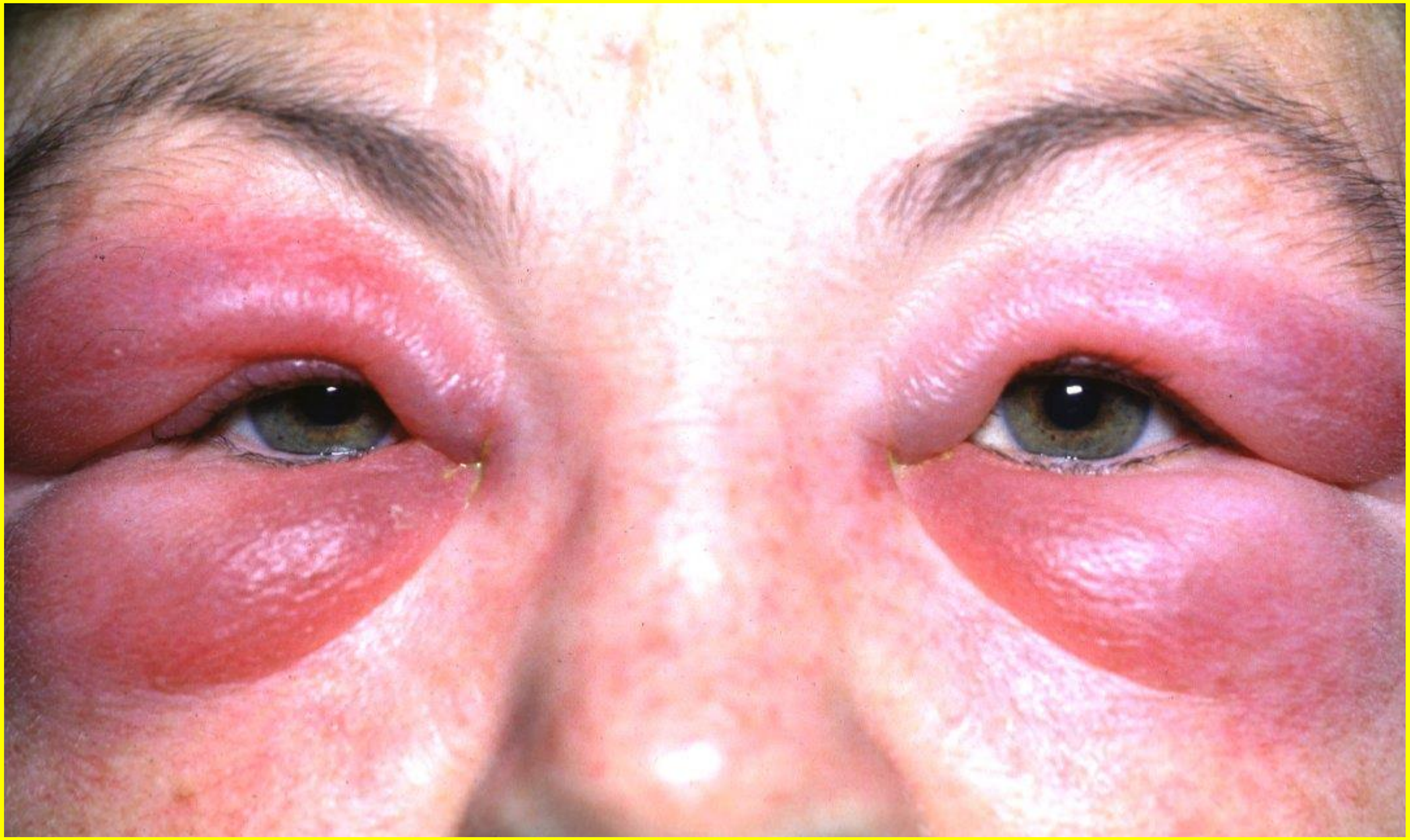
Treatment of Chronic Blepharitis

1. **Lid hygiene** - with 25% baby shampoo
2. **Tear substitutes** - for associated tear film instability
3. **Systemic tetracyclines** - for severe posterior blepharitis
4. **Warm compresses** - to melt solidified sebum in posterior blepharitis

DIFFUSE EYELID DISEASE

1. **Allergic**
   - Acute oedema
   - Contact dermatitis
   - Atopic dermatitis
   - Blepharochalasis
2. **Infections**
   - Preseptal cellulitis
   - Herpes simplex
   - Herpes zoster ophthalmicus
   - Impetigo
   - Erysipelas
   - Necrotizing fasciitis
3. **Miscellaneous**
   - Fat herniation
   - Systemic causes

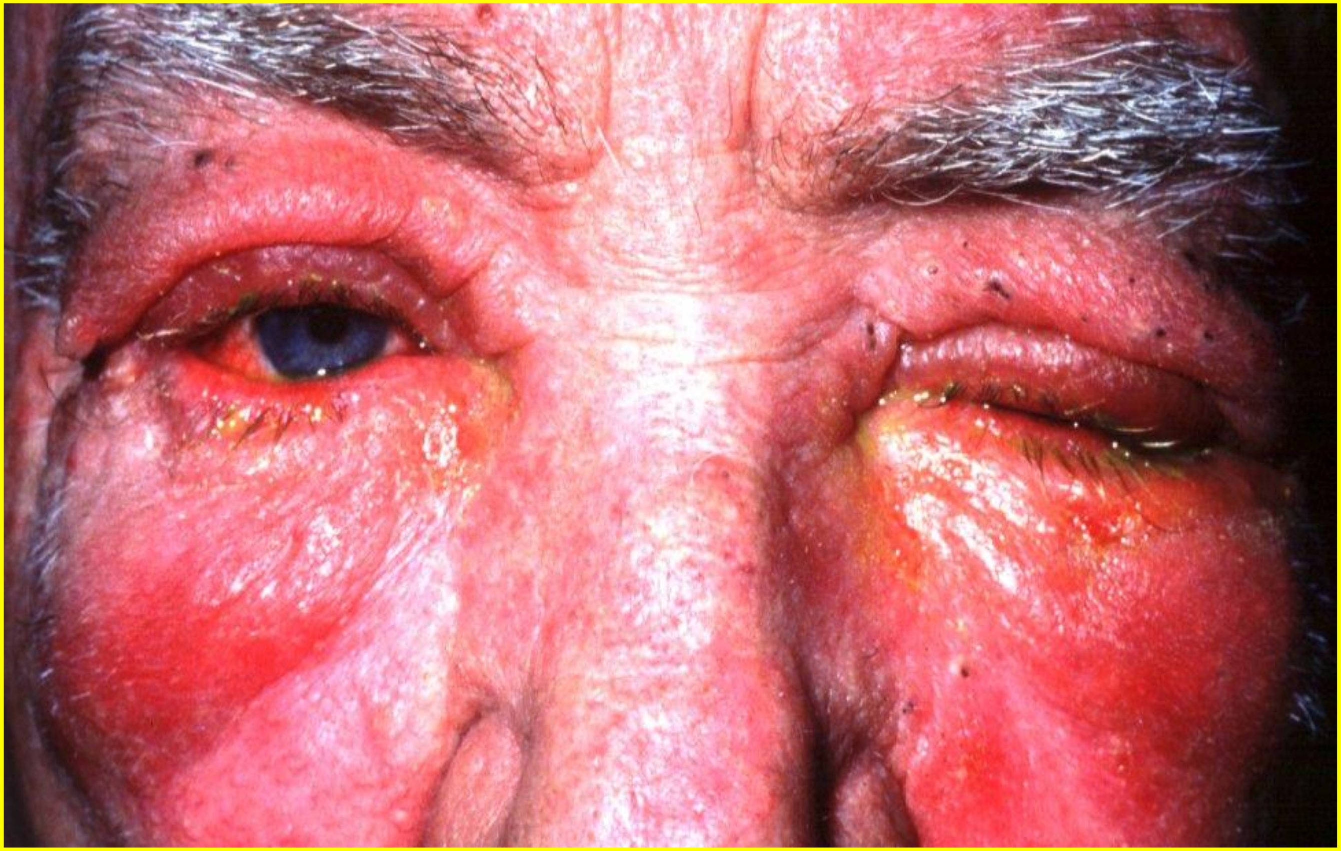
Acute allergic oedema



Causes - insect bites, urticaria and angioedema

- Unilateral or bilateral
- Painless, red, pitting oedema
- Chemosis may be present
- Self-limiting

Contact dermatitis



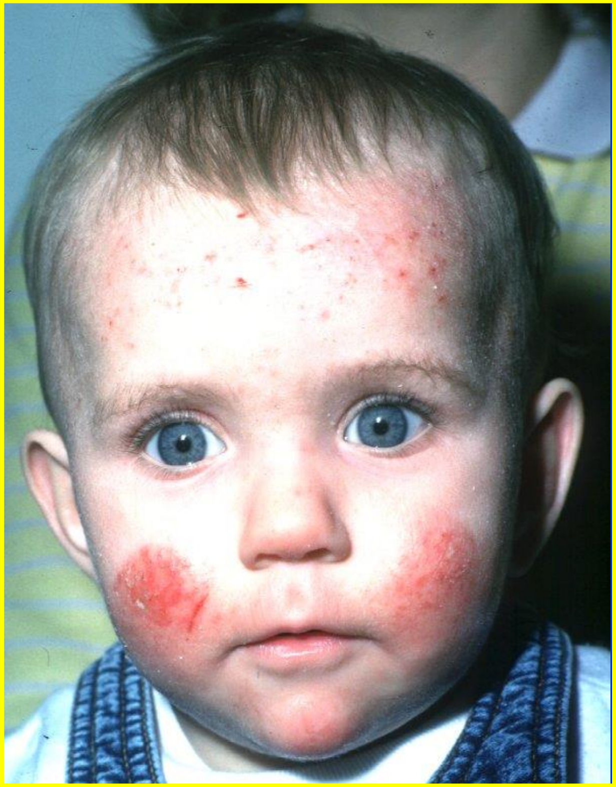
Sensitivity to topical medication

- Unilateral or bilateral
- Painless oedema and erythema
- Vesiculation and crusting
- Thickening if chronic

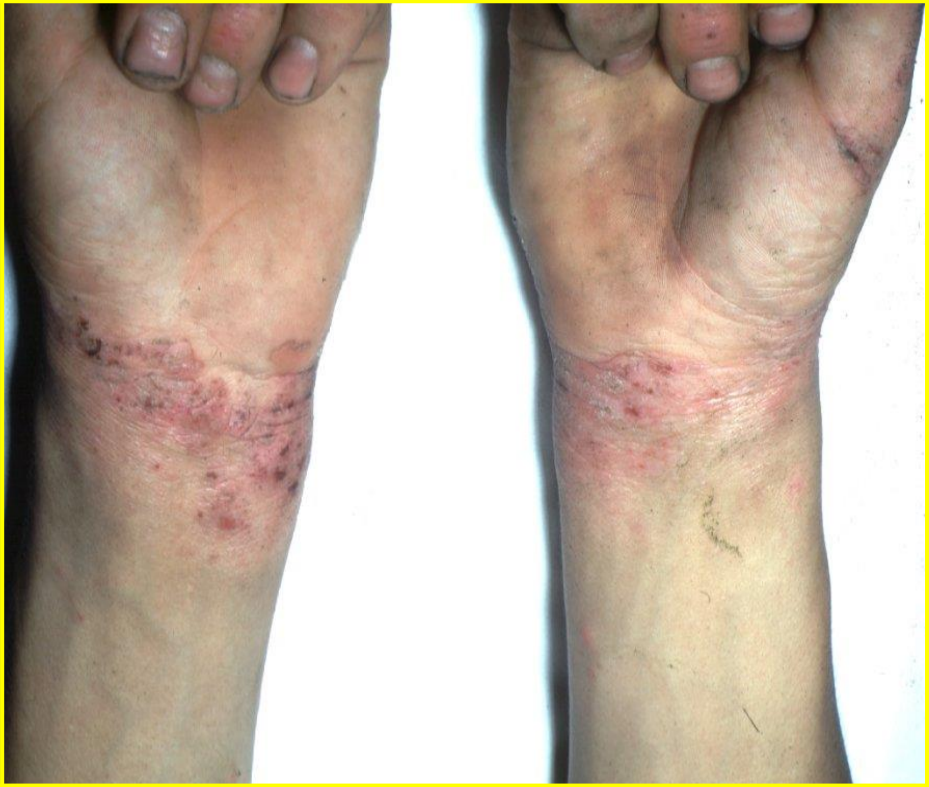
Atopic dermatitis

Associated with asthma and hay fever

- Chronic itching and scratching

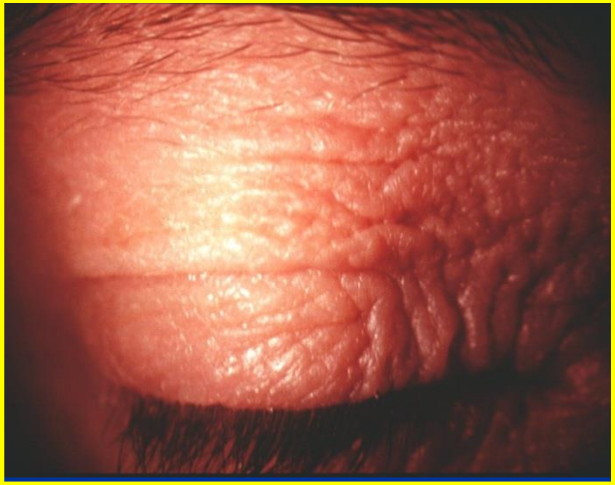


Facial - in young children

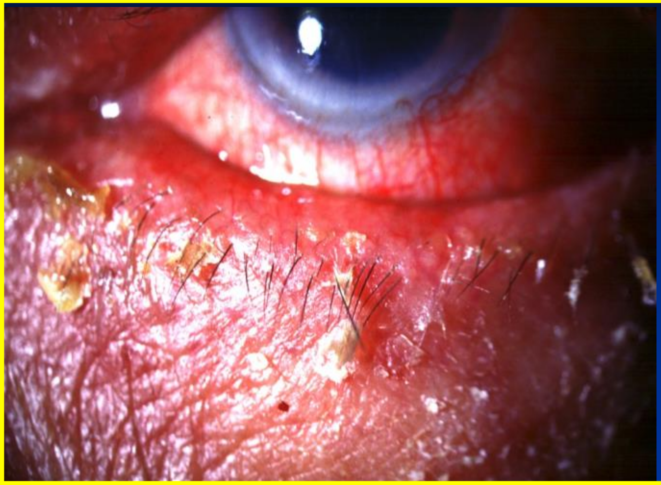


Flexural - knees, elbows, wrists and ankles

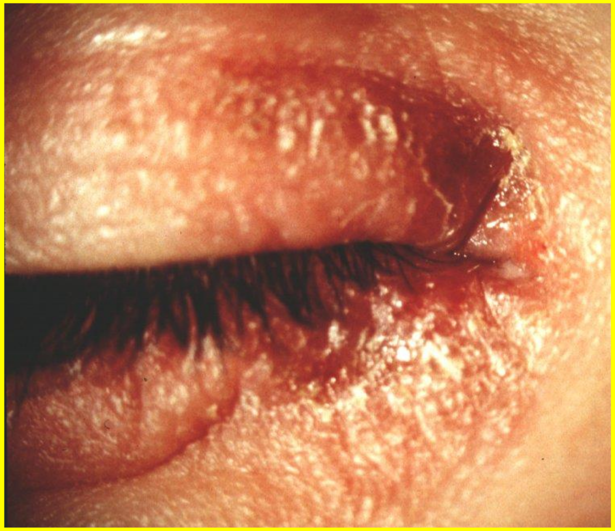
Ocular associations of atopic dermatitis



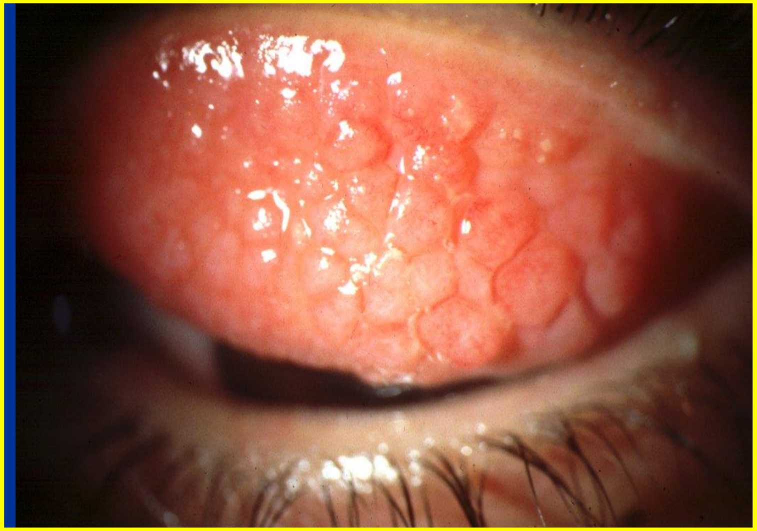
Thickening, crusting and fissuring



Staph. blepharitis

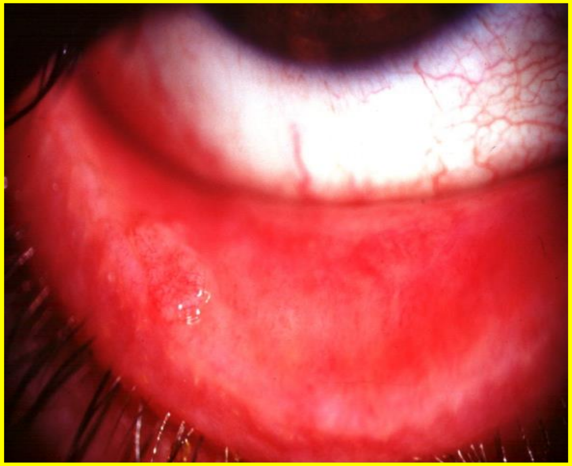


Angular blepharitis

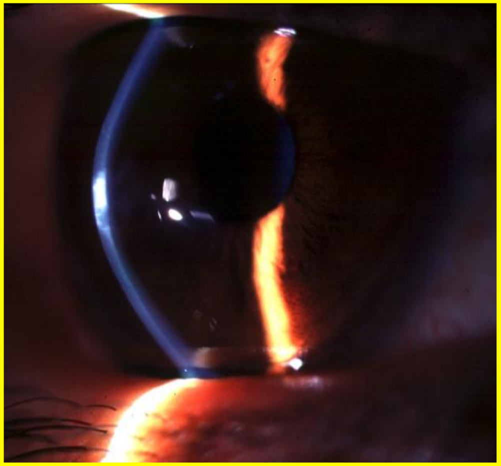


Vernal disease in children

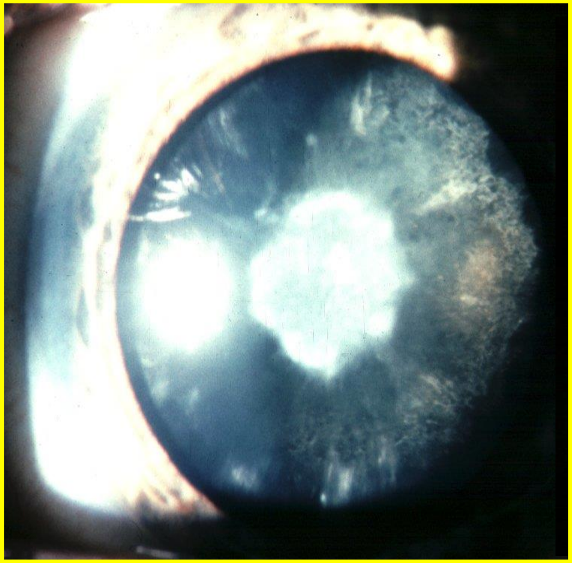
Ocular associations of atopic dermatitis



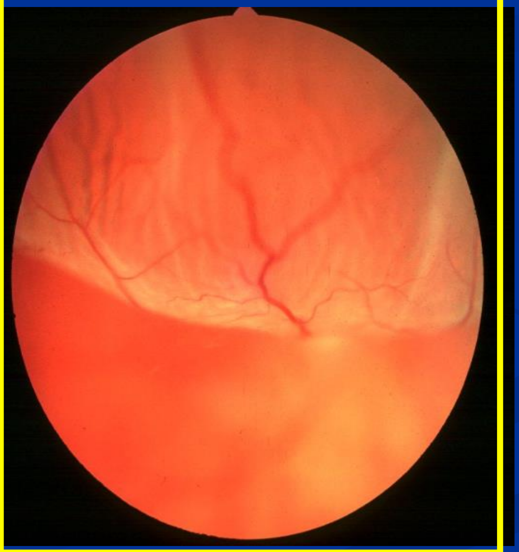
Keratoconjunctivitis



Keratoconus

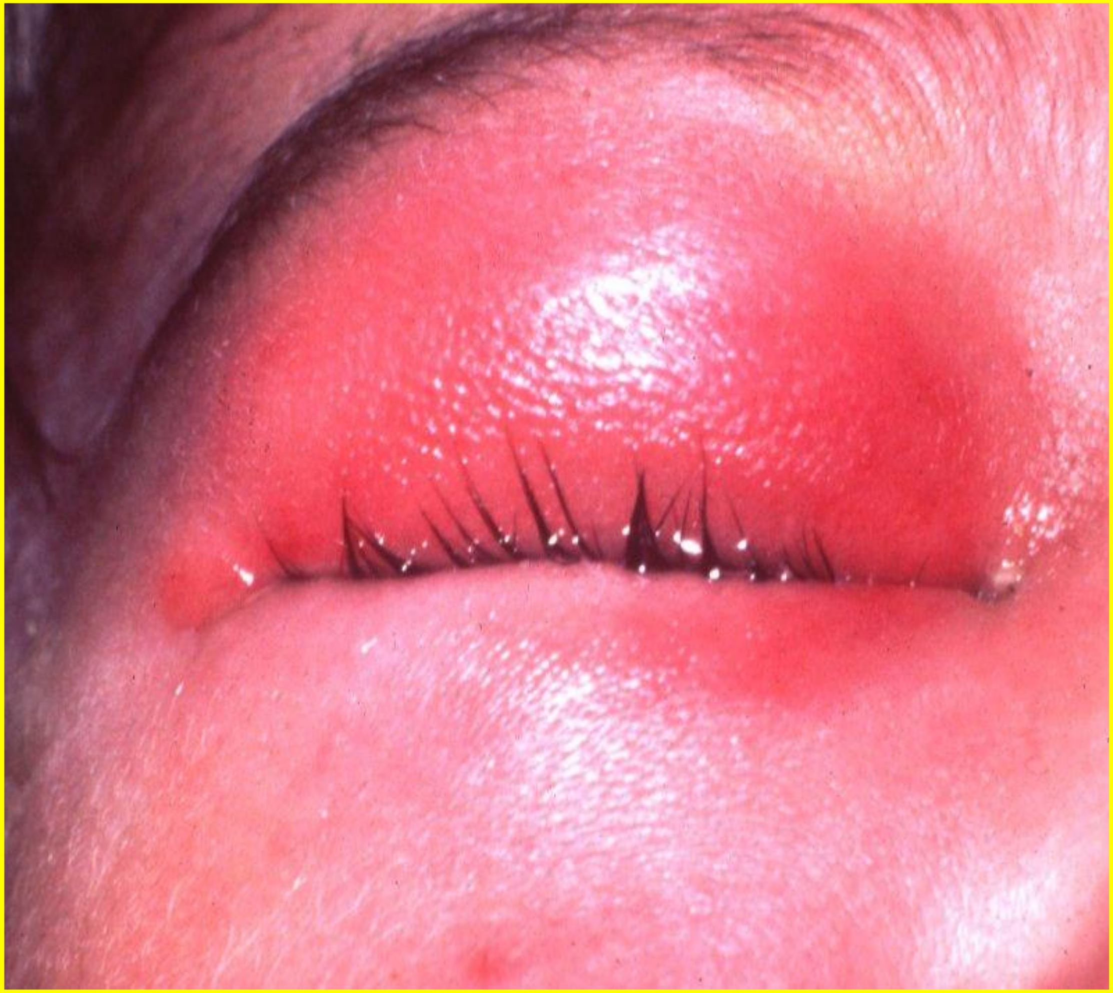


Shield - like cataract



Retinal detachment

Preseptal cellulitis



Causes

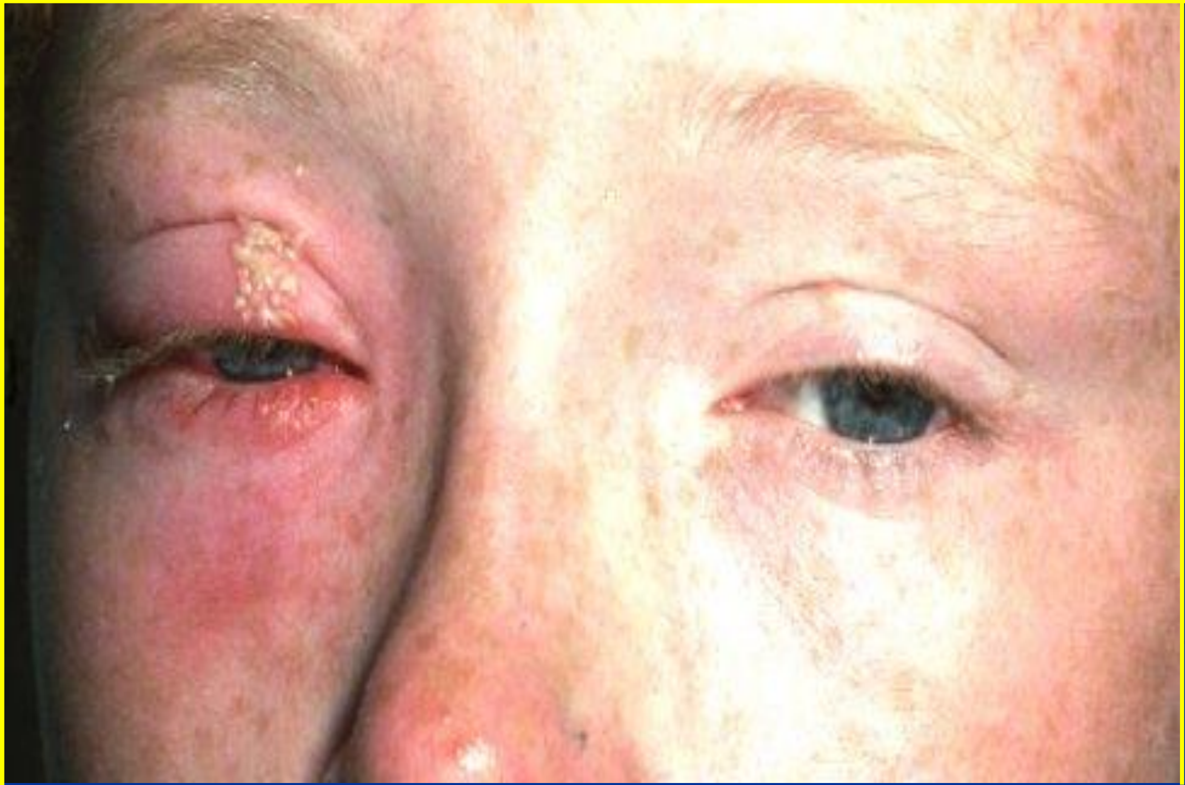
- Skin trauma or insect bites of lids or eyebrows
- Spread from local infection
- Upper respiratory or ear infection

Signs

- Usually unilateral
- Tender and red
- Periorbital oedema

Treatment – systemic antibiotics

Herpes simplex



Signs

- Crops of small vesicles
- Rupture and crust
- Heal without scarring after 7 days

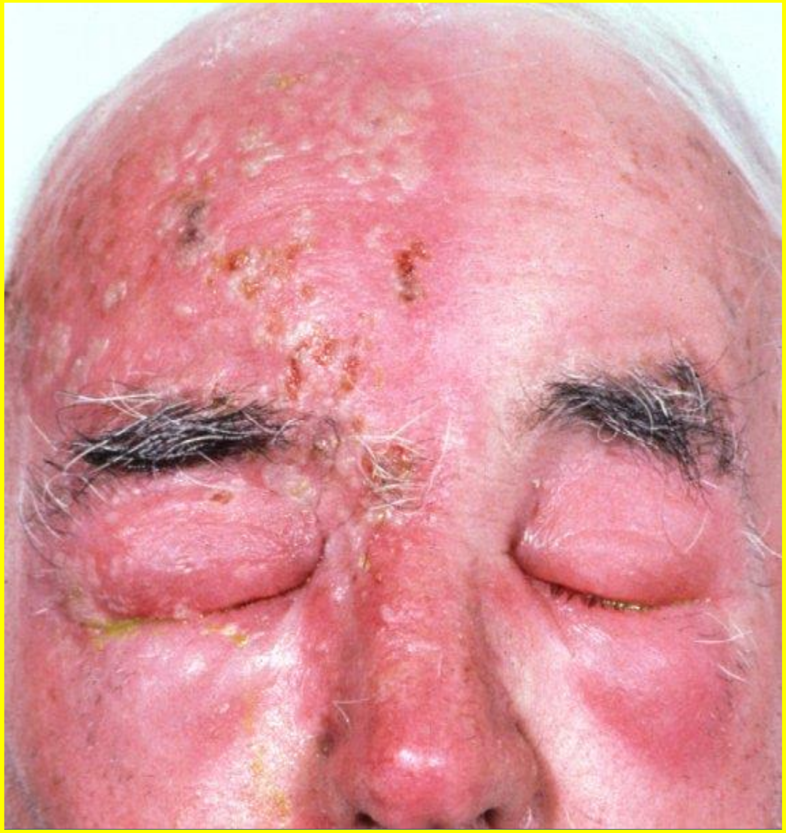
Complications

- Follicular conjunctivitis
- Keratitis

Treatment

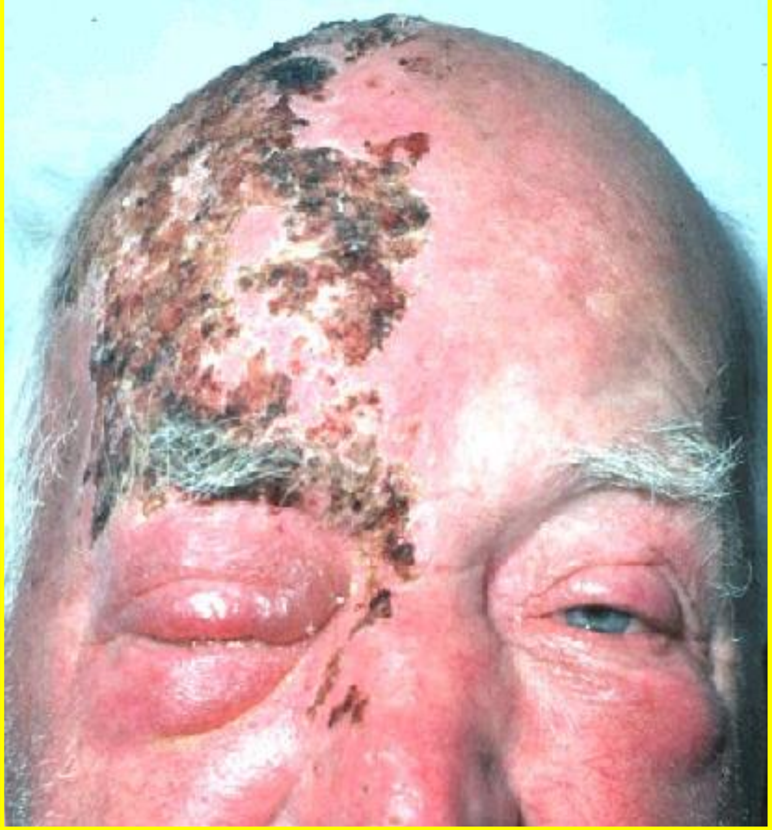
Topical antivirals

Herpes zoster ophthalmicus



Painful vesicles and pustules

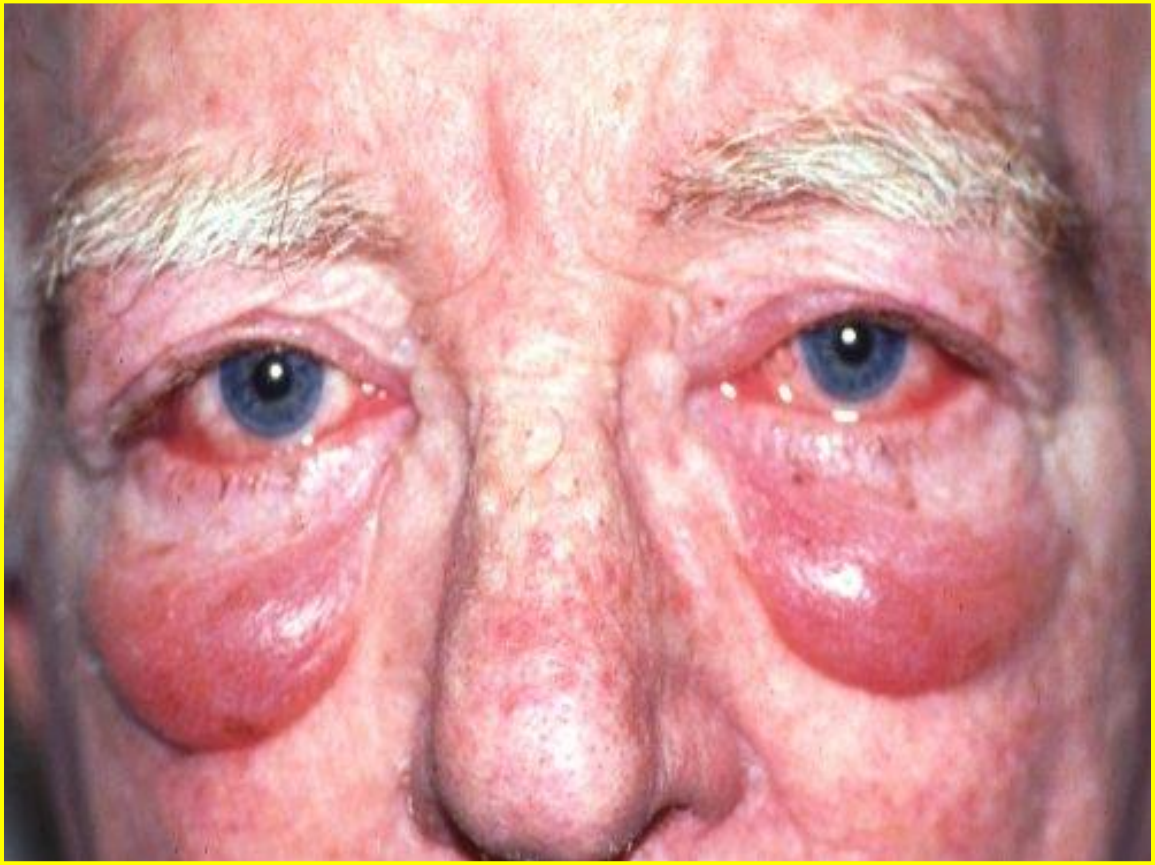
- Periorbital oedema - may be bilateral



Crusting ulceration

Treatment oral antivirals

Systemic causes of lid oedema



- Myxoedema
- Renal disease
- Congestive heart failure
- Obstruction of superior vena cava
- Fabry disease

BENIGN EYELID LESIONS

1. Nodules

- Chalazion
- Acute hordeola
- Molluscum contagiosum
- Xanthelasma

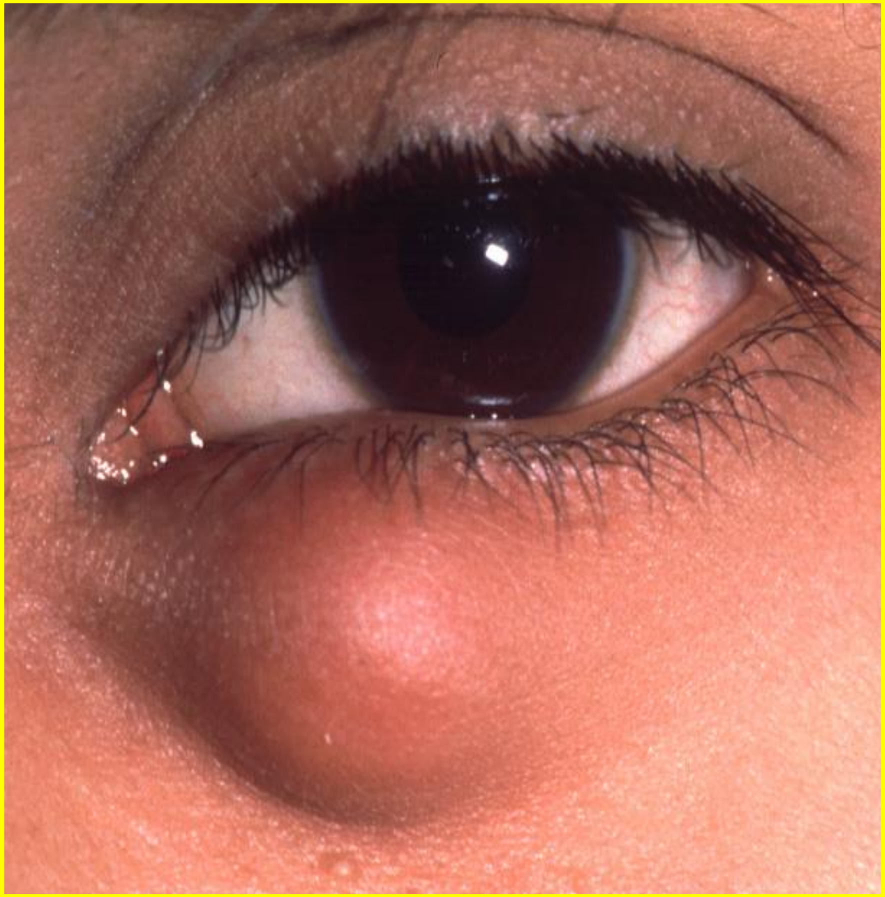
2. Cysts

- Cyst of Moll
- Cyst of Zeiss
- Sebaceous cyst
- Hidrocystoma

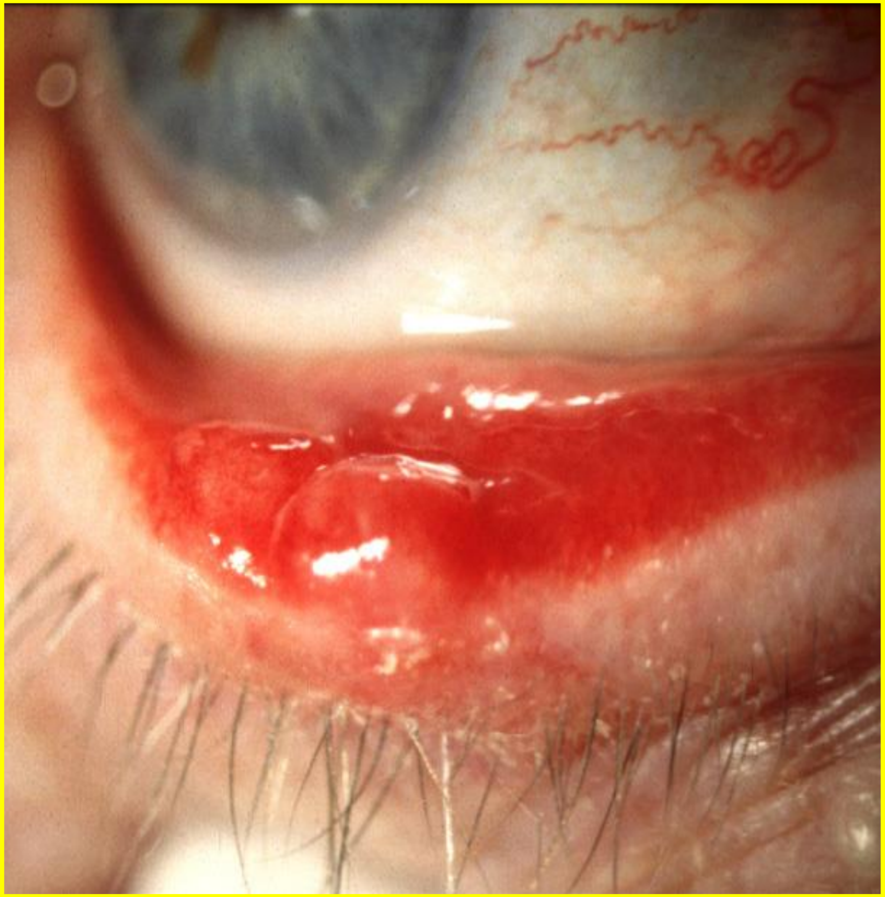
3. Tumours

- Viral wart
- Keratoacanthoma
- Naevi
- Capillary haemangioma
- Port-wine stain
- Pyogenic granuloma
- Cutaneous horn

Signs of Chalazion (Meibomian cyst)

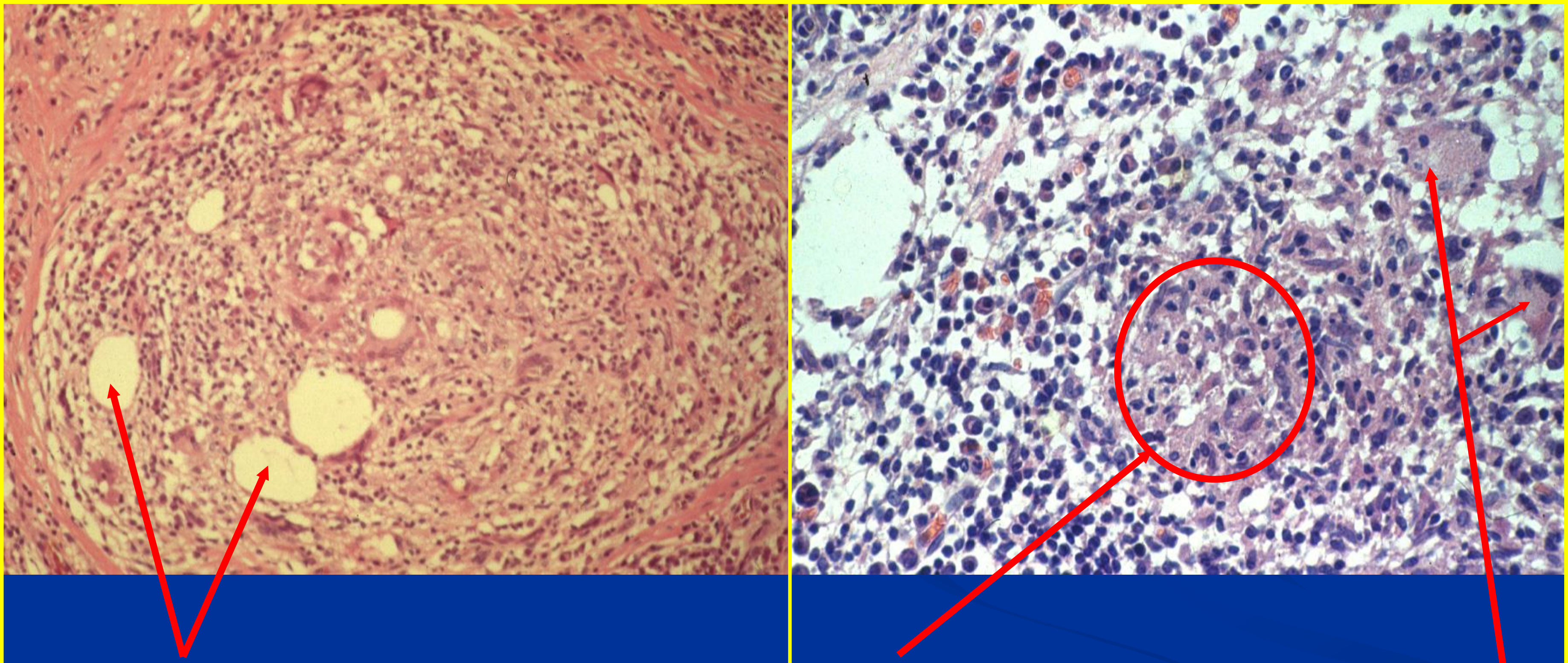


Painless, roundish, firm lesion within tarsal plate



May rupture through conjunctiva and cause granuloma

Histology of chalazion

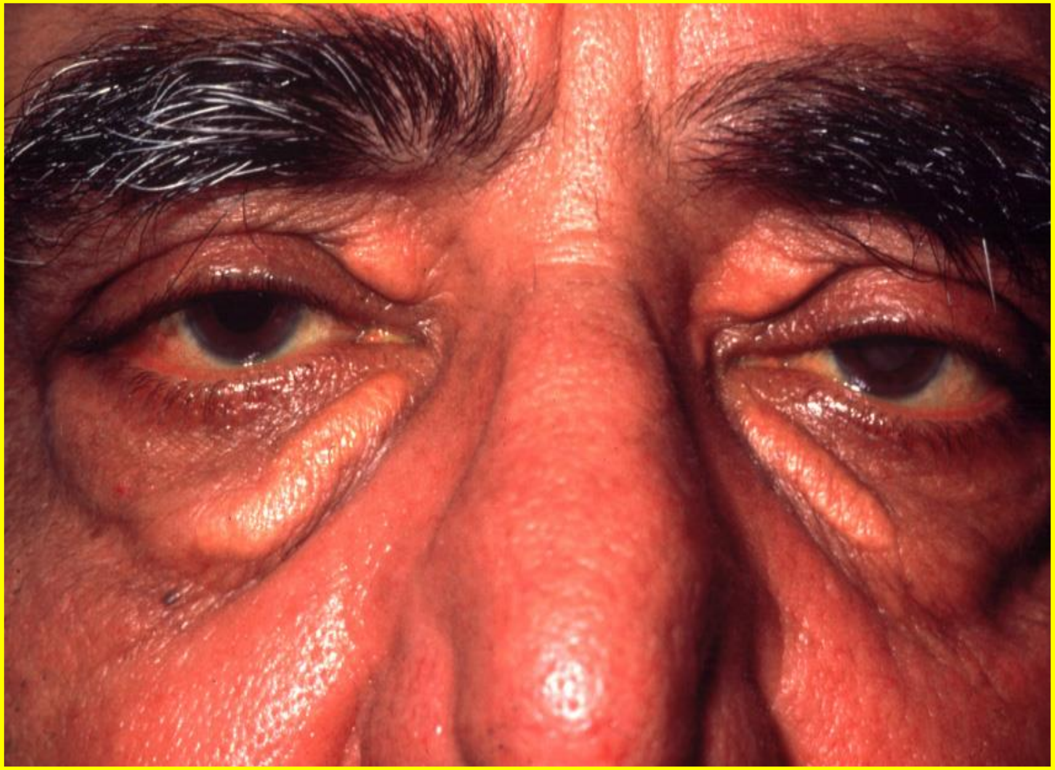


Multiple, round spaces previously containing fat with surrounding granulomatous inflammation

Epithelioid cells

Multinucleated giant cells

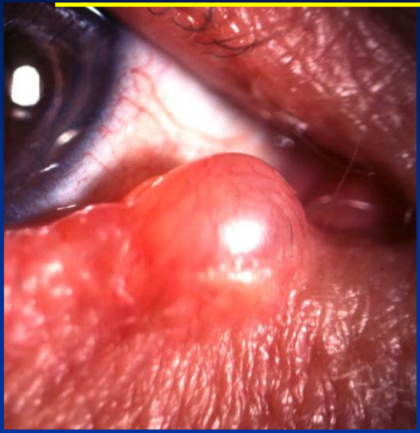
Xanthelasma



- Common in elderly or those with hypercholesterolaemia
- Yellowish, subcutaneous plaques containing cholesterol and lipid
- Usually bilateral and located medially

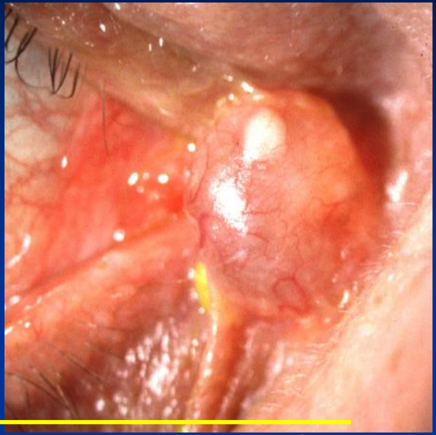
Eyelid cysts

Cyst of Moll



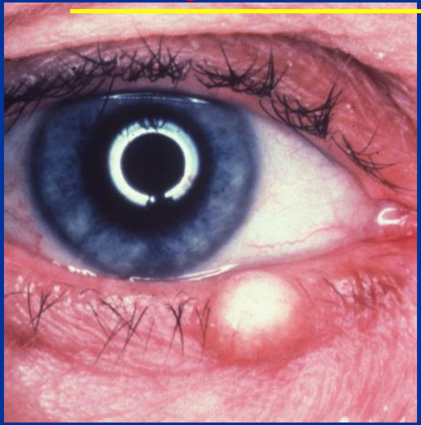
- Translucent
- On anterior lid margin

Eccrine sweat gland hidrocystoma



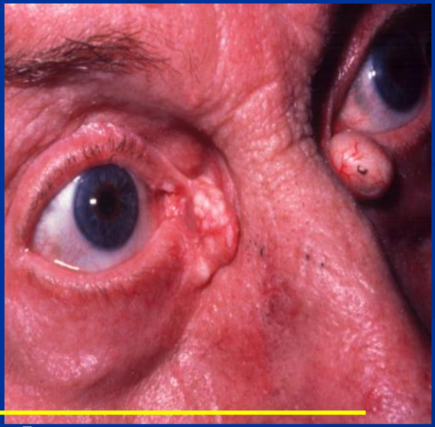
- Similar to cyst of Moll
- Not confined to lid margin

Cyst of Zeis



- Opaque
- On anterior lid margin

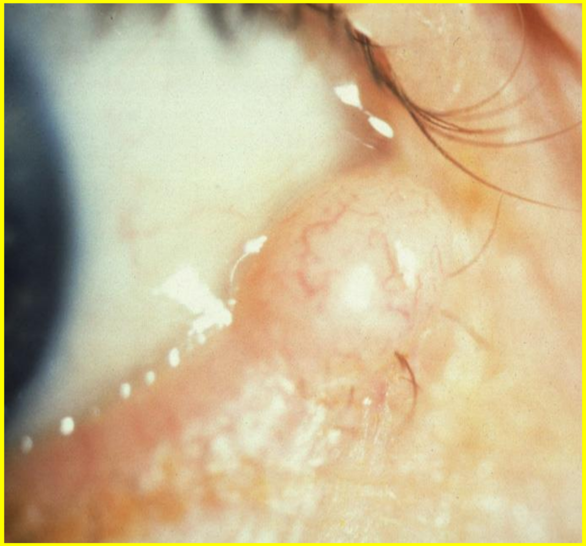
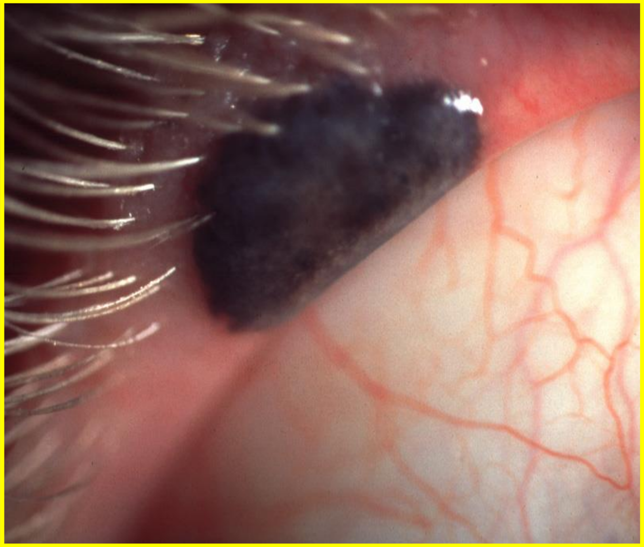
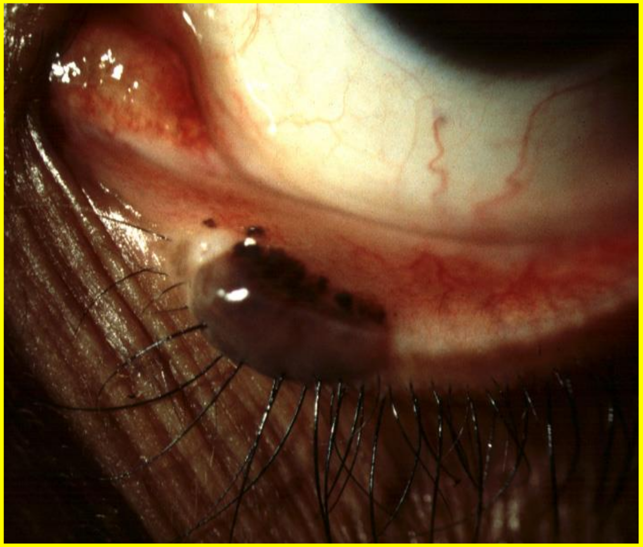
Sebaceous cyst



- Cheesy contents
- Frequently at inner canthus

Naevi

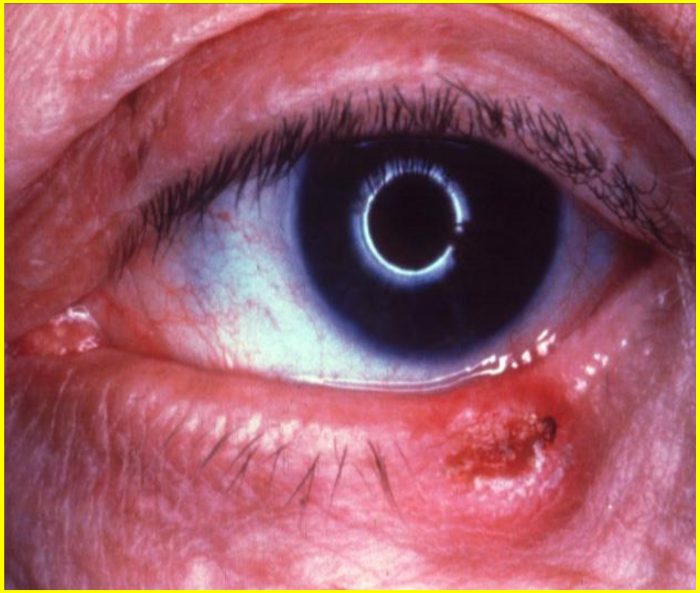
- Appearance and classification determined by location within skin
- Tend to become more pigmented at puberty

Intradermal	Junctional	Compound
		
• Elevated • May be non-pigmented • No malignant potential	• Flat, well-circumscribed • Pigmented • Low malignant potential	• Has both intradermal and junctional components

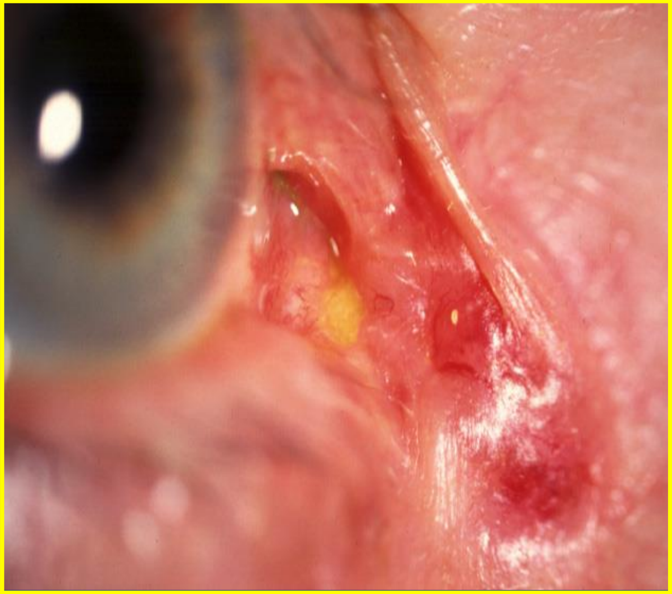
MALIGNANT EYELID TUMOURS

1. **Basal cell carcinoma**
2. **Squamous cell carcinoma**
3. **Meibomian gland carcinoma**
4. **Melanoma**
5. **Kaposi sarcoma**

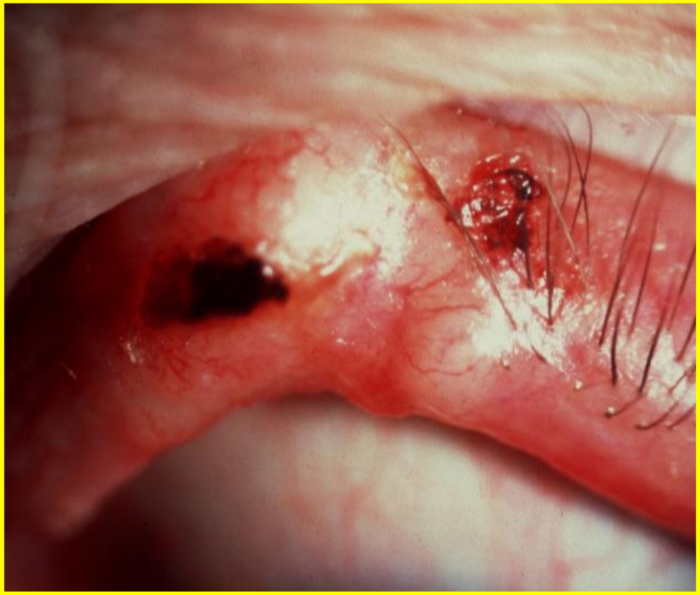
Frequency of location of basal cell carcinoma



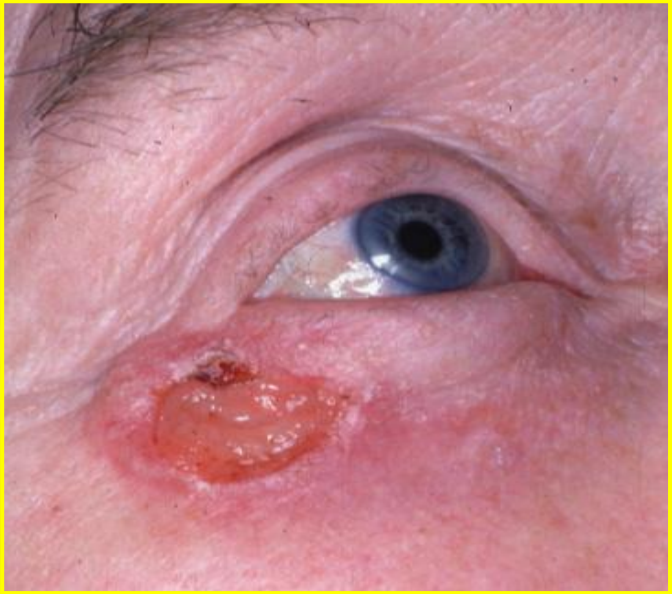
Lower lid - 70%



Medial canthus - 15%



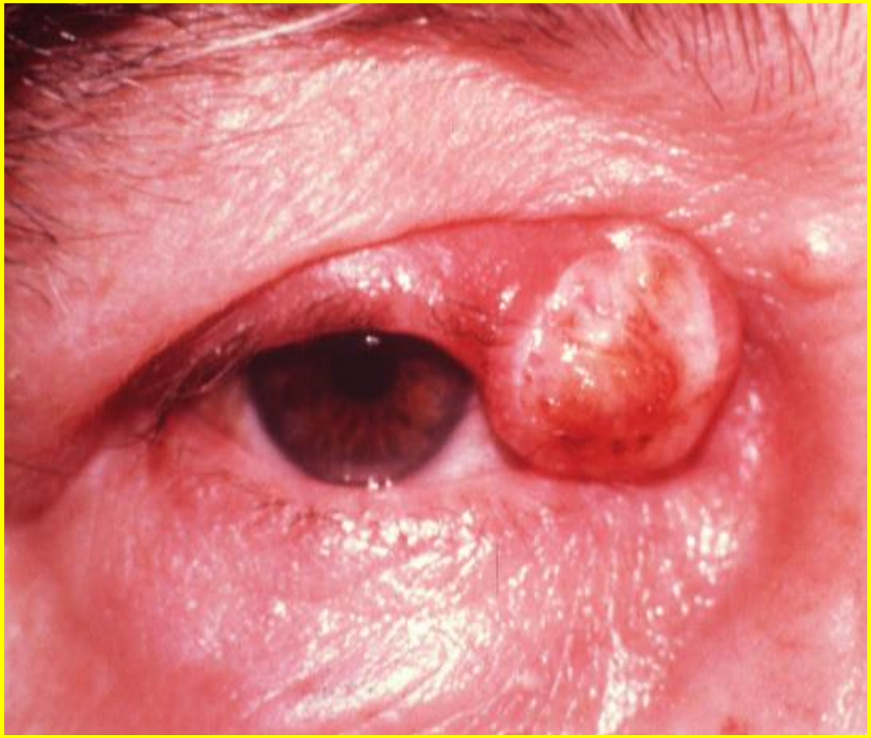
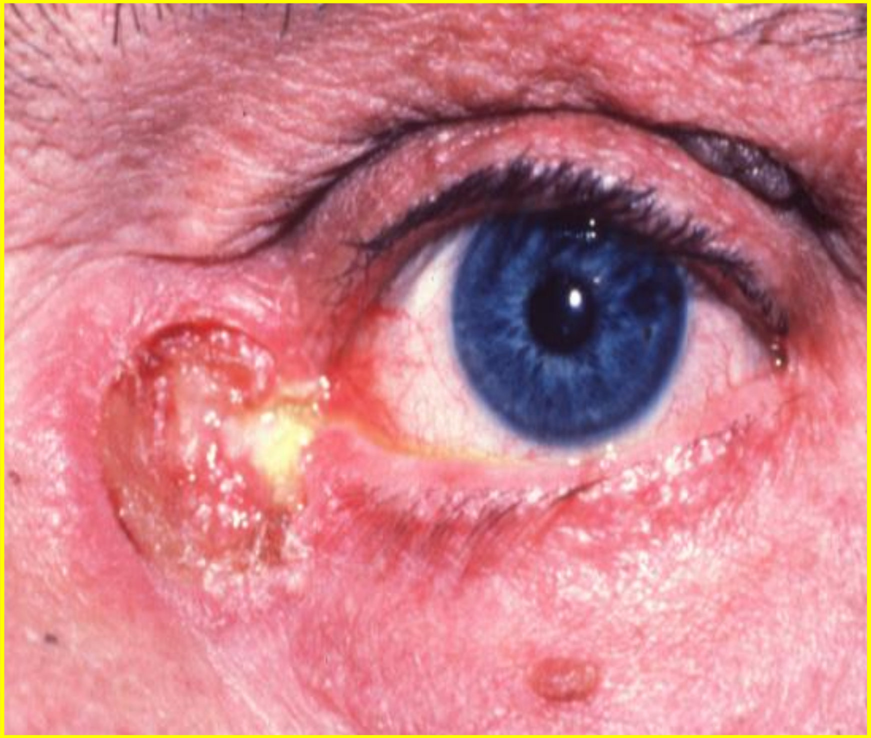
Upper lid - 10%



Lateral canthus - 5%

Squamous cell carcinoma

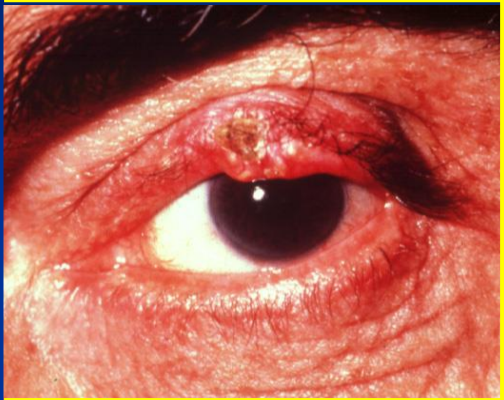
- Less common but more aggressive than BCC
- May arise *de novo* or from actinic keratosis
- Predilection for lower lid

Nodular	**Ulcerative**
	
• Hard, hyperkeratotic nodule • No surface vascularization • May develop crusting fissures	• Red base • Borders sharply defined, indurated and elevated

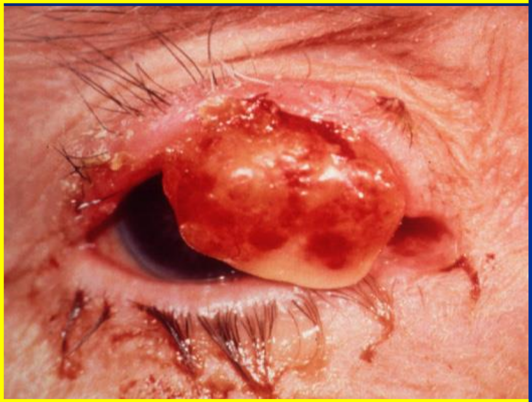
Meibomian gland carcinoma

- Very rare aggressive tumour with 10% mortality
- Predilection for upper lid

Nodular

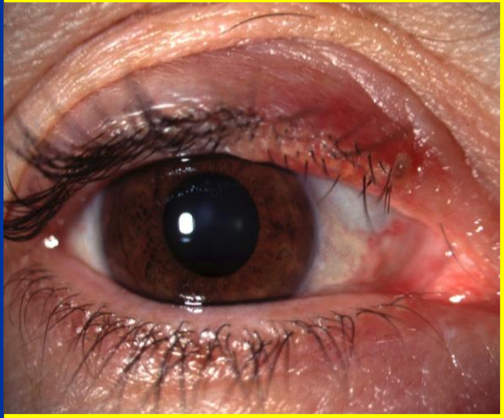


Hard nodule; may mimic a chalazion

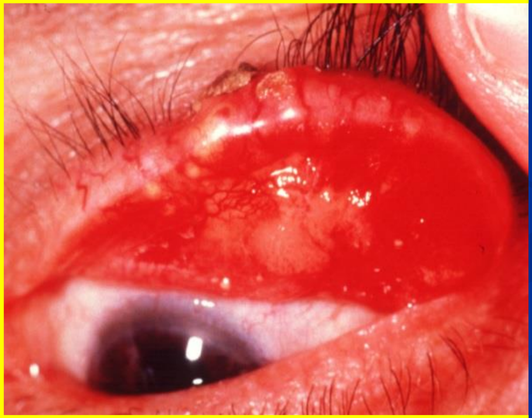


Very large tumour

Spreading

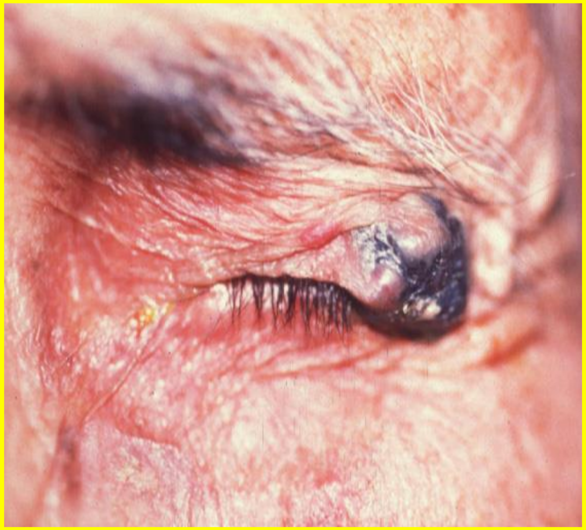
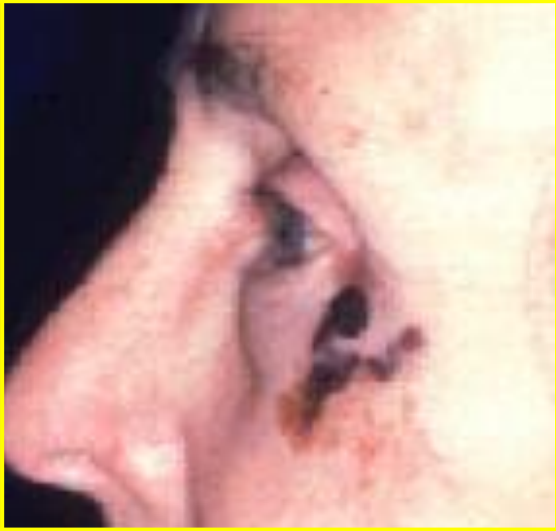
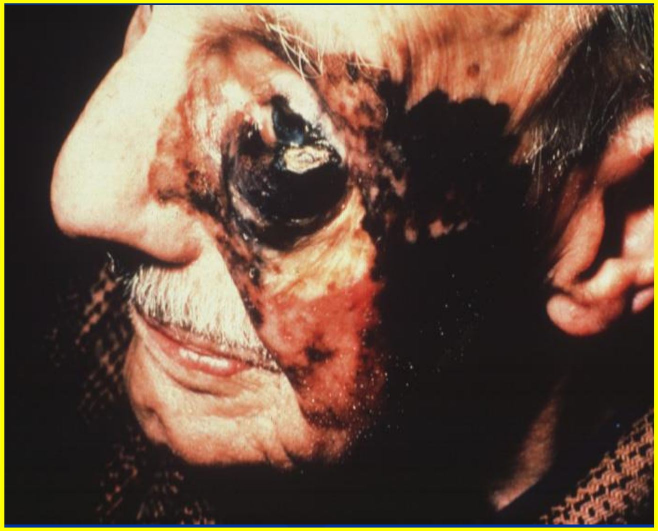


Diffuse thickening of lid margin and loss of lashes



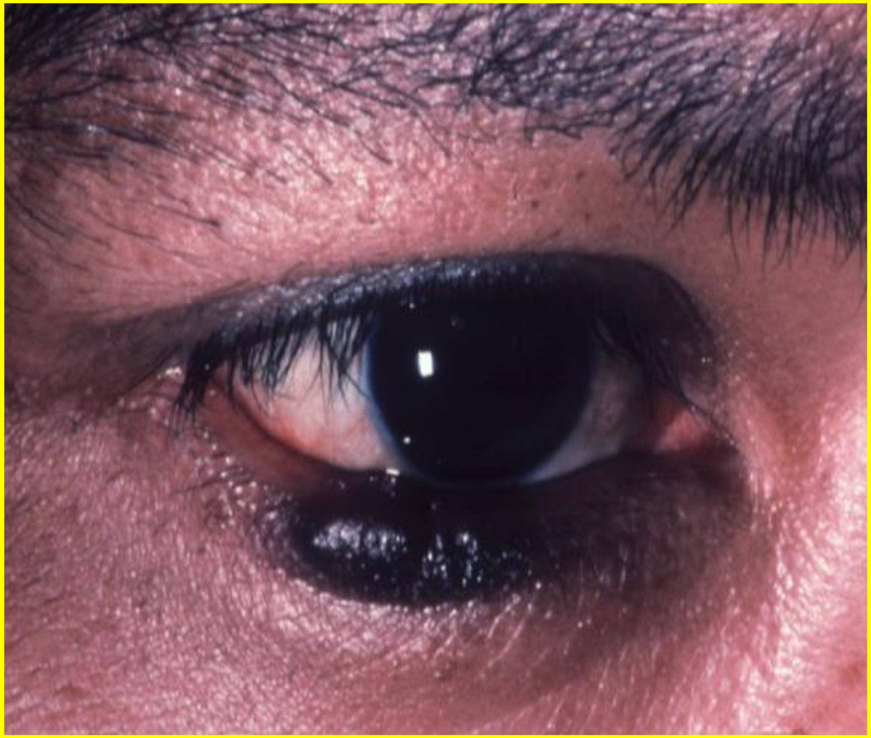
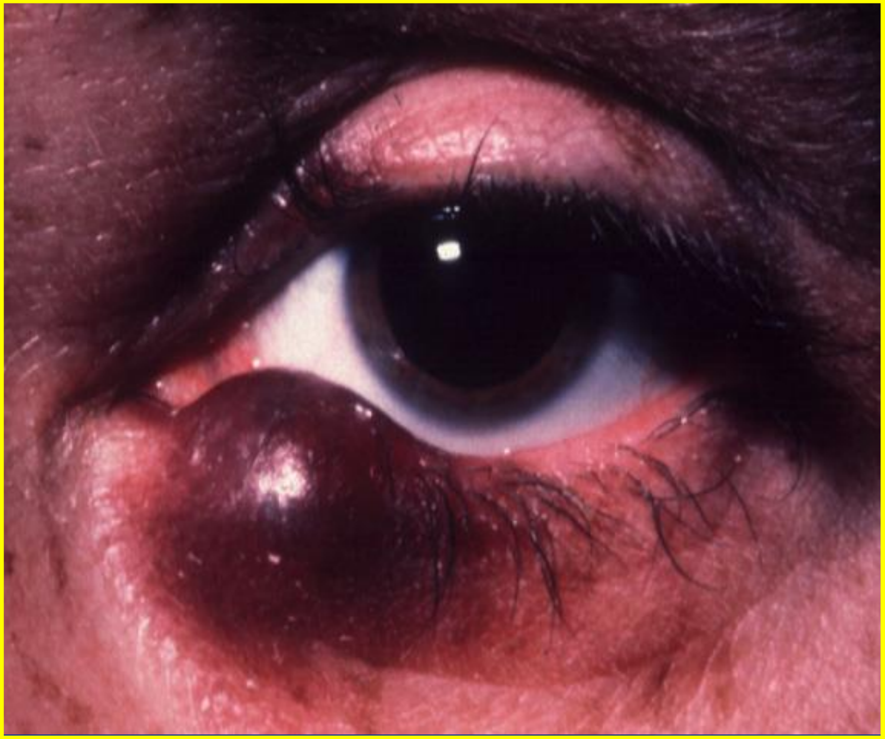
Conjunctival invasion; may mimic chronic conjunctivitis

Melanoma

Nodular	Superficial spreading	From lentigo maligna (Hutchinson freckle)
		
• Blue-black nodule with normal surrounding skin • May be non-pigmented	• Plaque with irregular outline • Variable pigmentation	• Affects elderly • Slowly expanding pigmented macule

Kaposi sarcoma

- Vascular tumour occurring in patients with AIDS
- Usually associated with advanced disease
- Very sensitive to radiotherapy

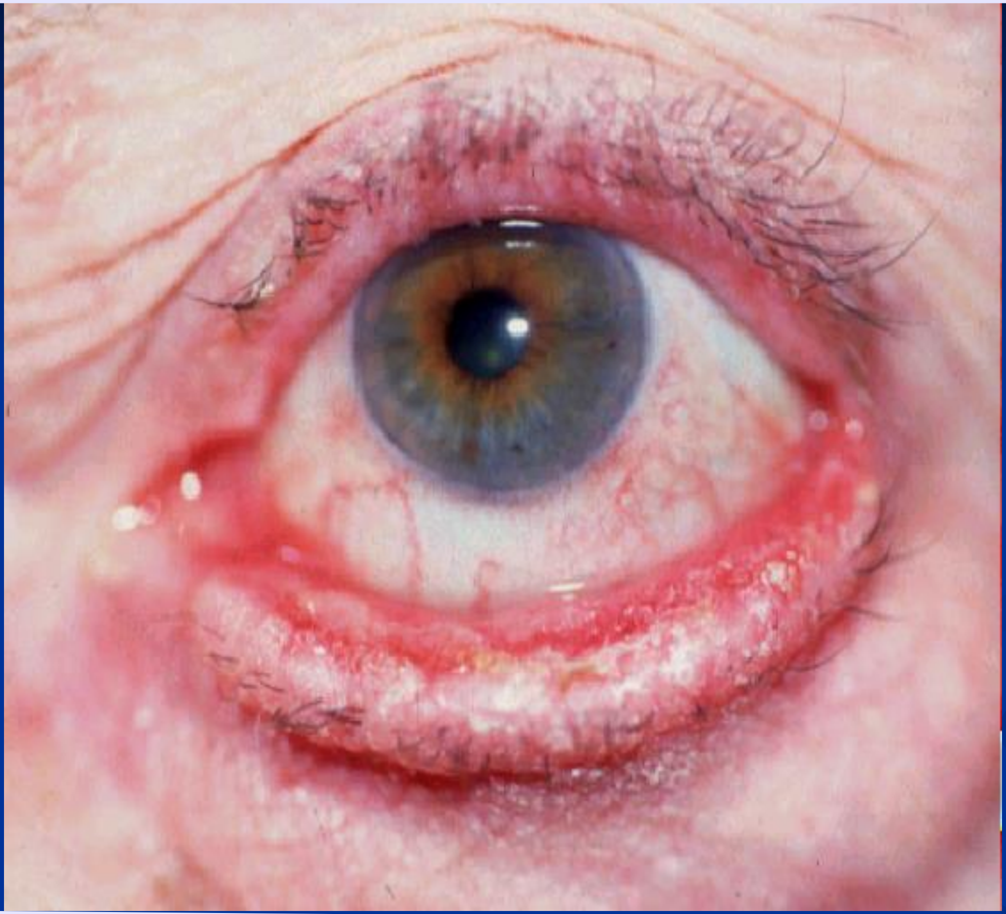
Early	Advanced
	
Pink, red-violet lesion	May ulcerate and bleed

ECTROPION AND ENTROPION

1. **Ectropion**
    - Involutional
    - Cicatricial
    - Paralytic
    - Mechanical

2. **Entropion**
    - Involutional
    - Cicatricial
    - Congenital
    - Epiblepharon

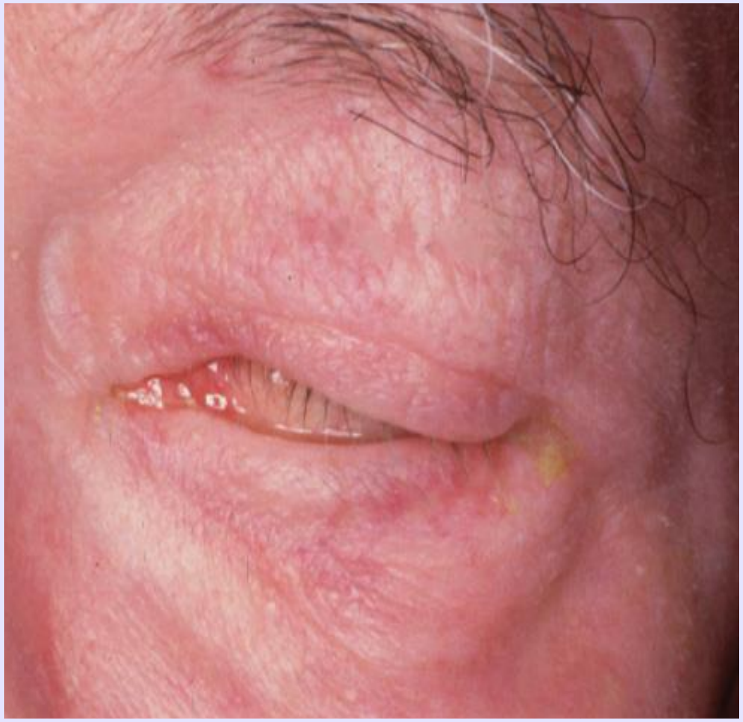
Involutional Ectropion



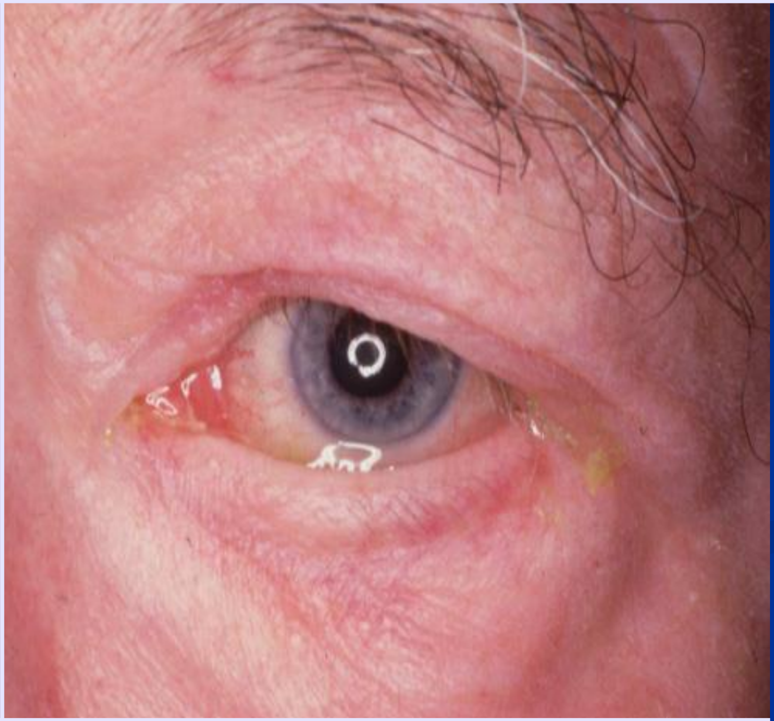
- Affects lower lid of elderly patients
- May cause chronic conjunctival inflammation and thickening

Paralytic Ectropion

Caused by facial nerve palsy which, if severe, may give rise to the following:



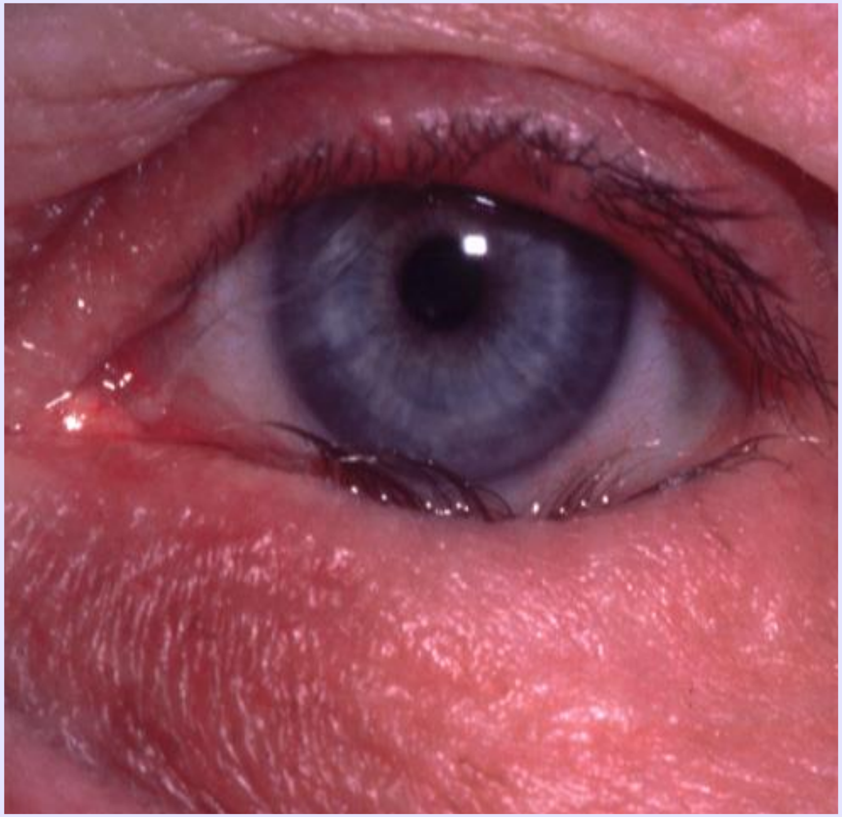
Exposure keratopathy caused by lagophthalmos



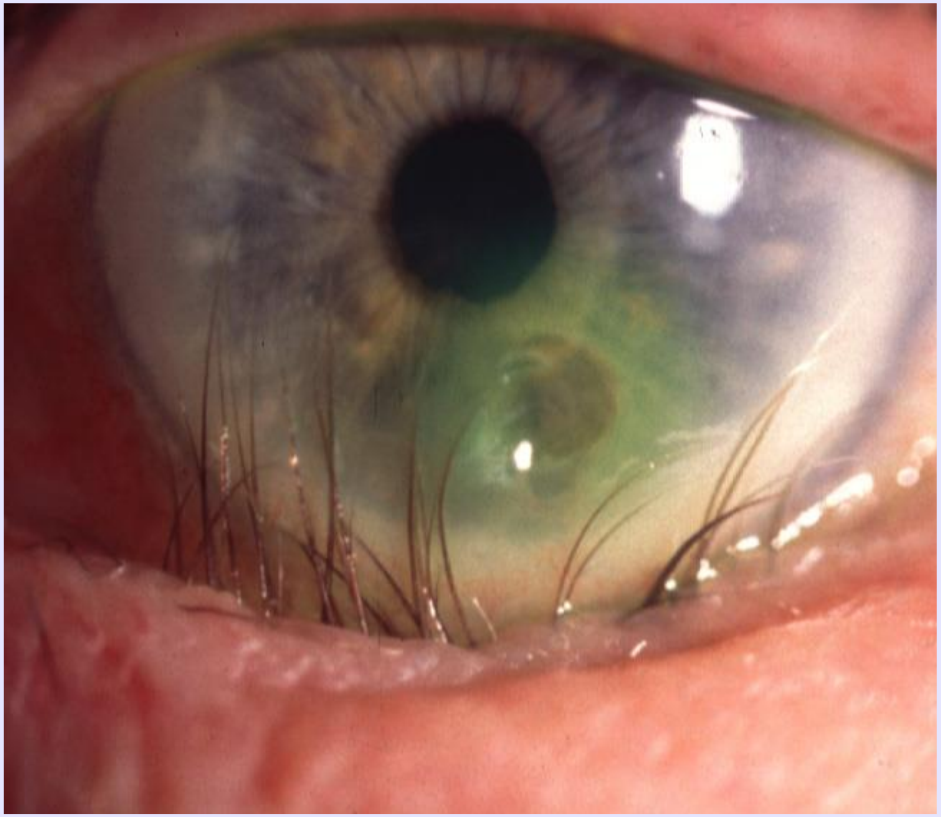
Epiphora caused by combination of:

- **Failure of lacrimal pump mechanism**
- **Increase in tear production resulting from corneal exposure**

Involutional Entropion

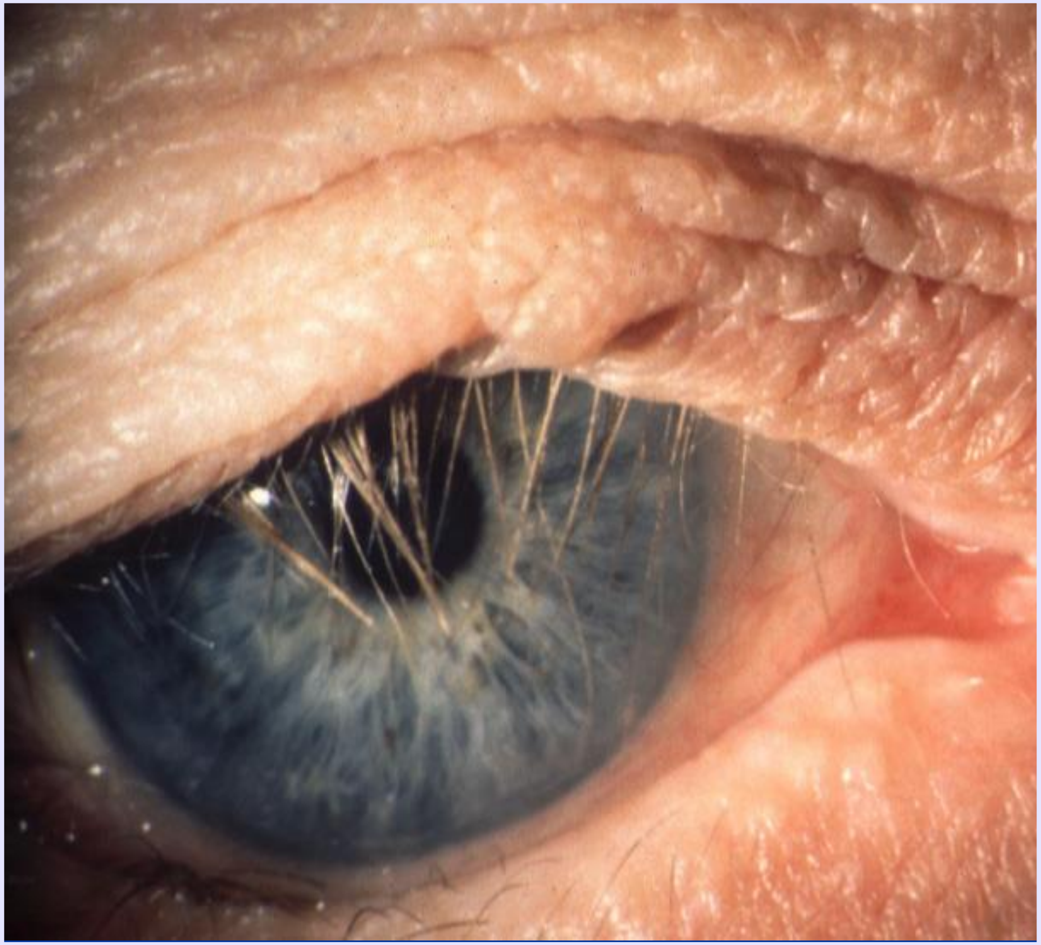


Affects lower lid because upper lid has wider tarsus and is more stable



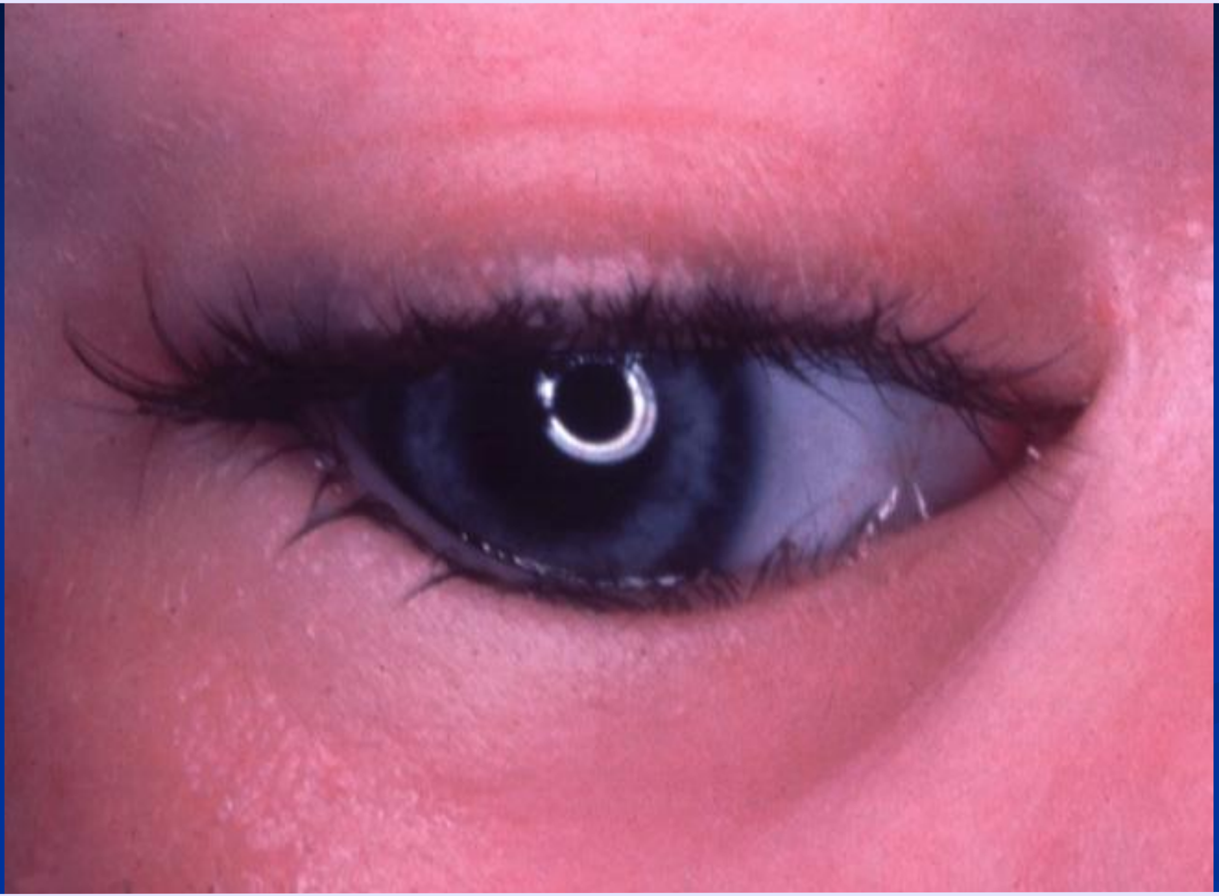
If longstanding may result in corneal ulceration

Cicatricial Entropion



- **Severe scarring of palpebral conjunctiva which pulls lid margin towards globe**
- **May affect lower or upper eyelid**
- **Causes include cicatrizing conjunctivitis, trachoma and chemical burns**

Congenital Entropion

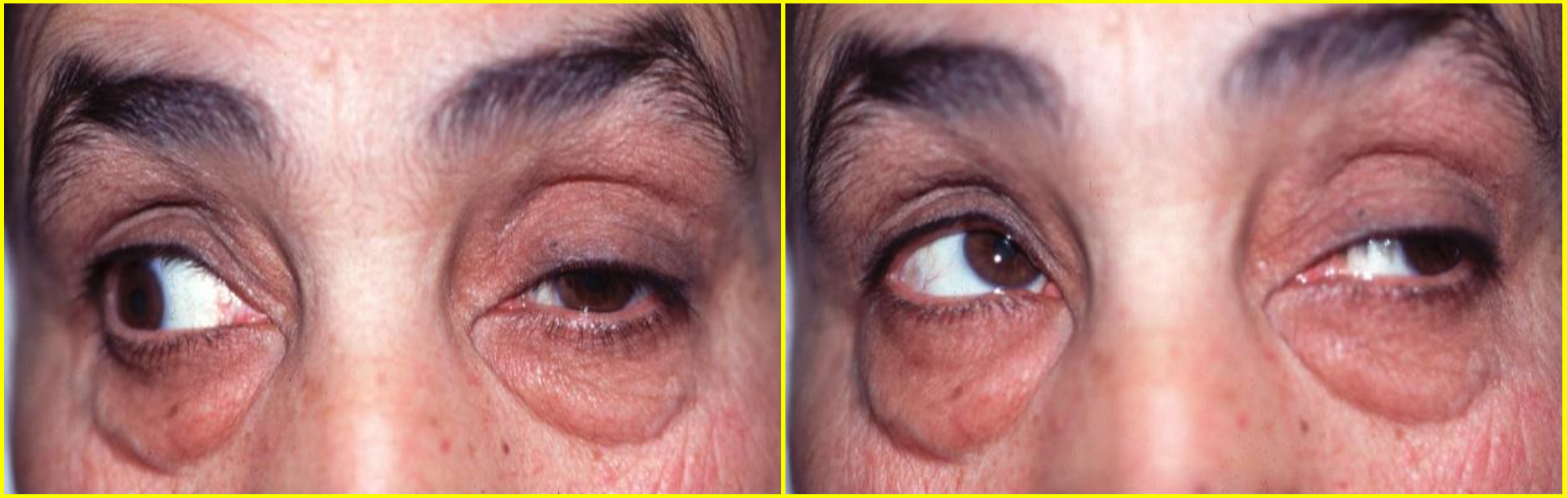


- Very rare - not to be confused with epiblepharon
- Inturning of entire lower eyelid and lashes
- Absence of lower lid crease
- When skin is pulled down lid also pulls away from globe
- Does not resolve spontaneously

CLASSIFICATION OF PTOSIS

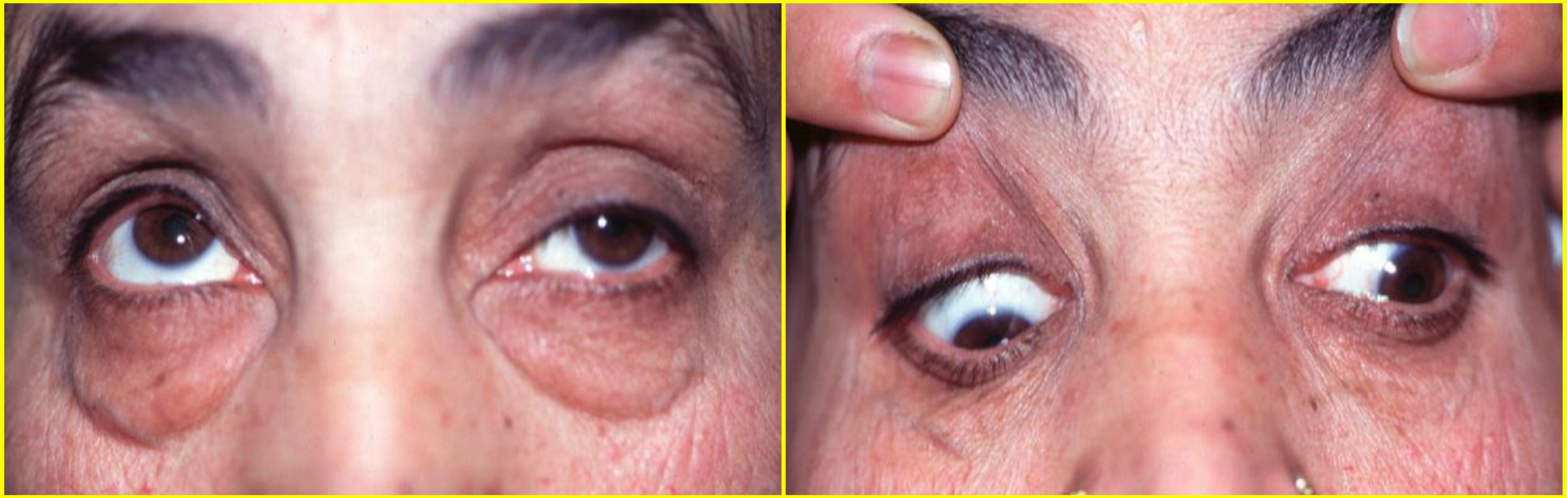
1. **Neurogenic**
    - Third nerve palsy
    - Third nerve misdirection
    - Horner syndrome
    - Marcus Gunn jaw-winking syndrome
2. **Myogenic**
    - Myasthenia gravis
    - Myotonic dystrophy
    - Ocular myopathies
    - Simple congenital
    - Blepharophimosis syndrome
3. **Aponeurotic**
4. **Mechanical**

Left third nerve palsy



Severe unilateral ptosis and defective adduction

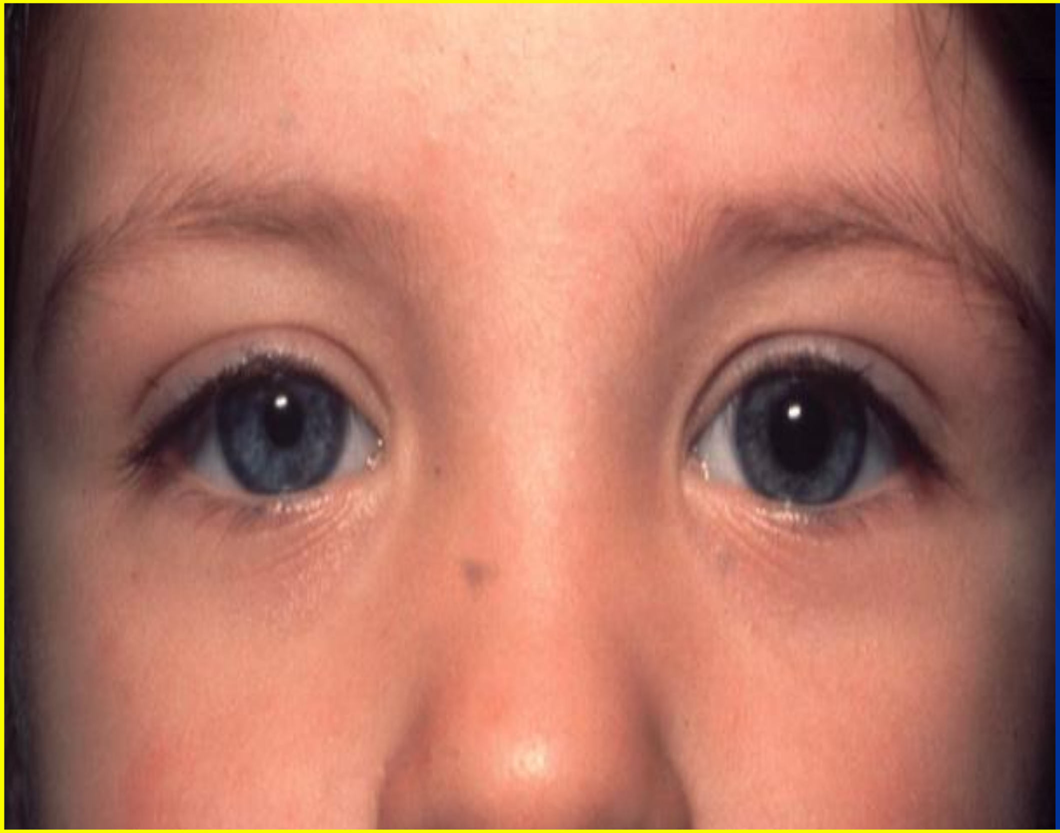
Normal abduction



Defective elevation

Defective depression

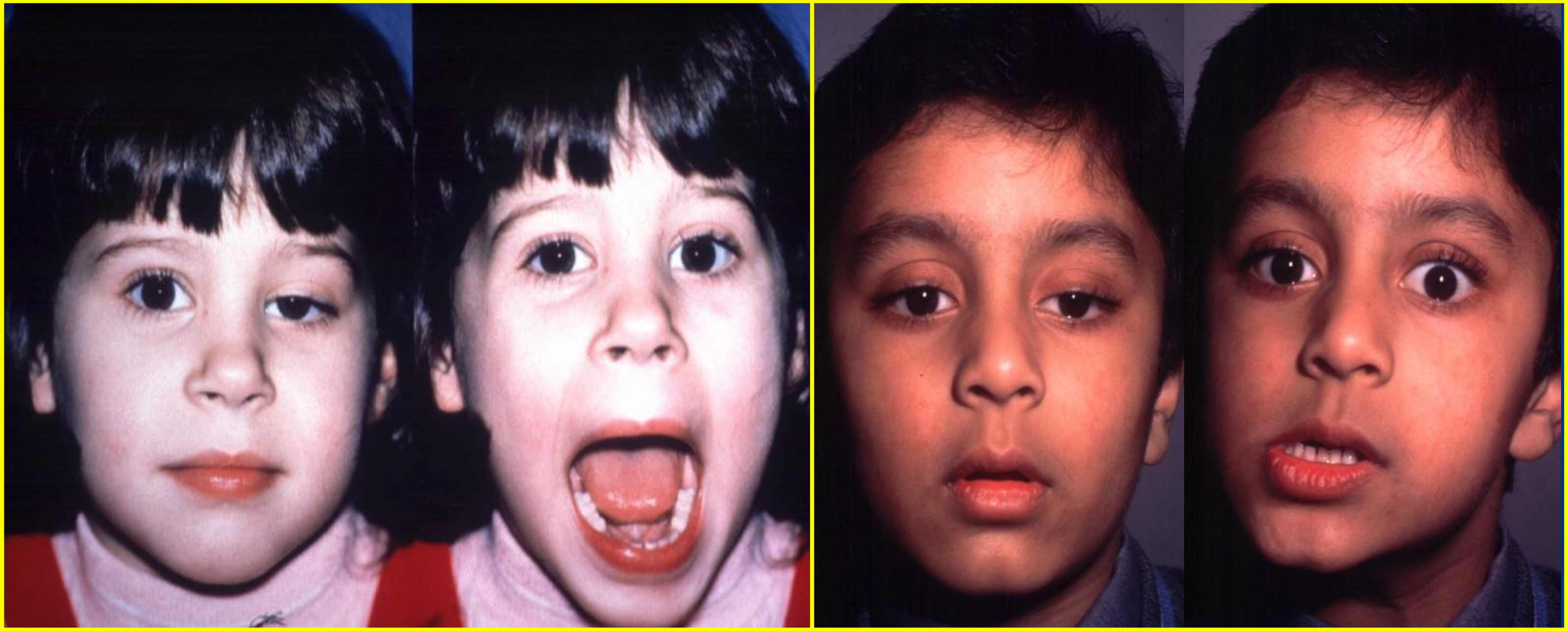
Horner syndrome



- Caused by oculosympathetic palsy
- Usually unilateral mild ptosis and miosis
- Normal pupillary reactions
- Slight elevation of lower lid
- Iris hypochromia if congenital or longstanding
- Anhydrosis if lesion is below superior cervical ganglion

Marcus Gunn jaw-winking syndrome

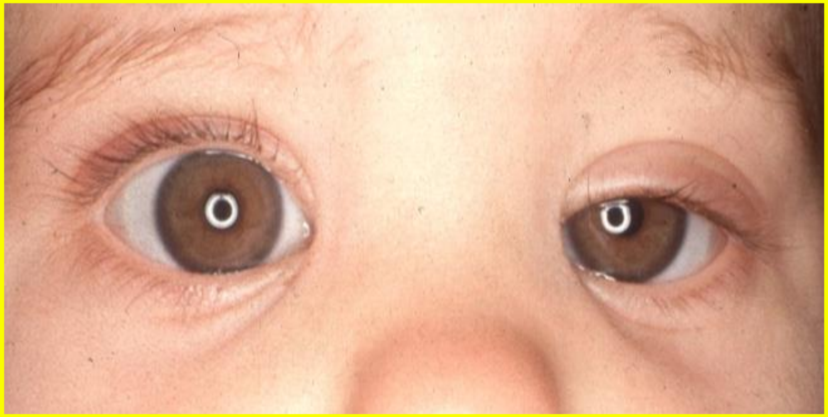
- Accounts for about 5% of all cases of congenital ptosis
- Retraction or 'wink' of ptotic lid in conjunction with stimulation of ipsilateral pterygoid muscles



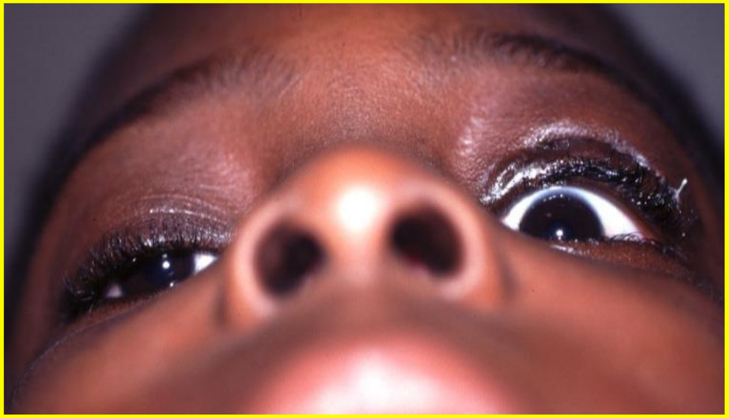
Opening of mouth	Contralateral movement of jaw

Simple congenital Ptosis

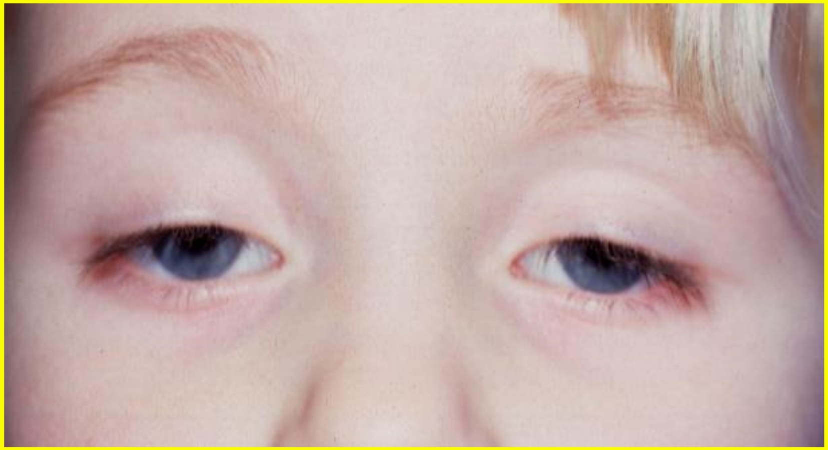
- Developmental dystrophy of levator muscle
- Occasionally associated with weakness of superior rectus



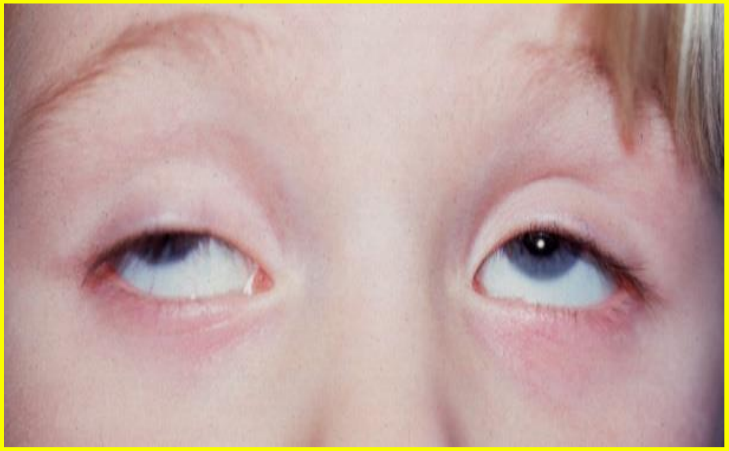
Unilateral or bilateral ptosis of varying severity



In downgaze ptotic eyelid is slightly higher



Frequent absence of upper lid crease

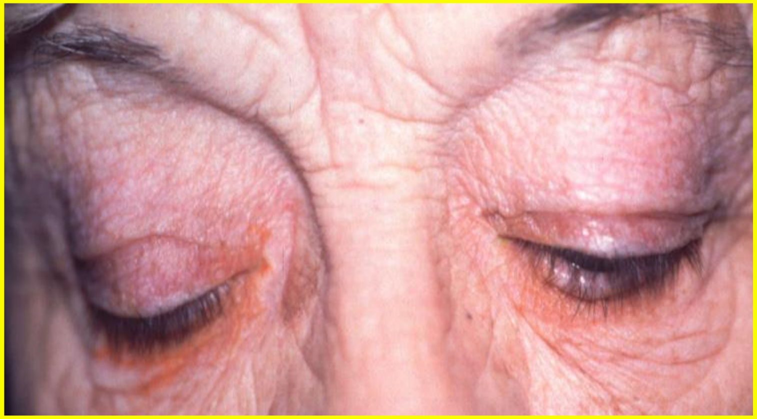


Usually poor levator function

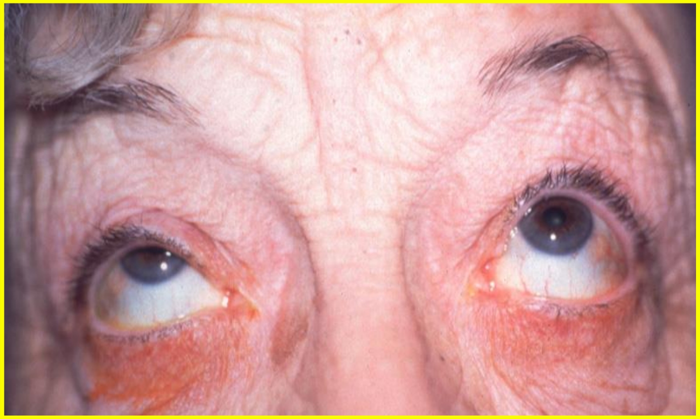
Aponeurotic Ptosis

- Weakness of levator aponeurosis
- Causes - involutional, postoperative and blepharochalasis

Mild

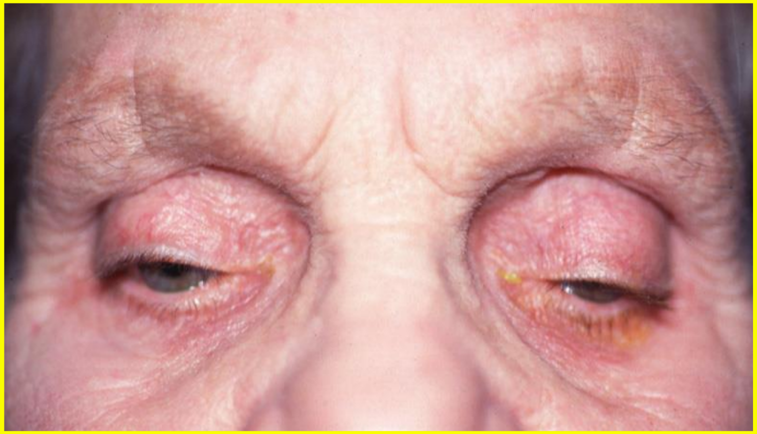


High upper lid crease

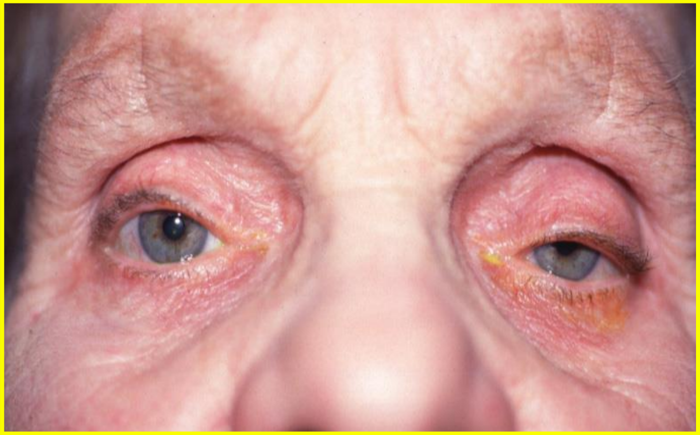


Good levator function

Severe

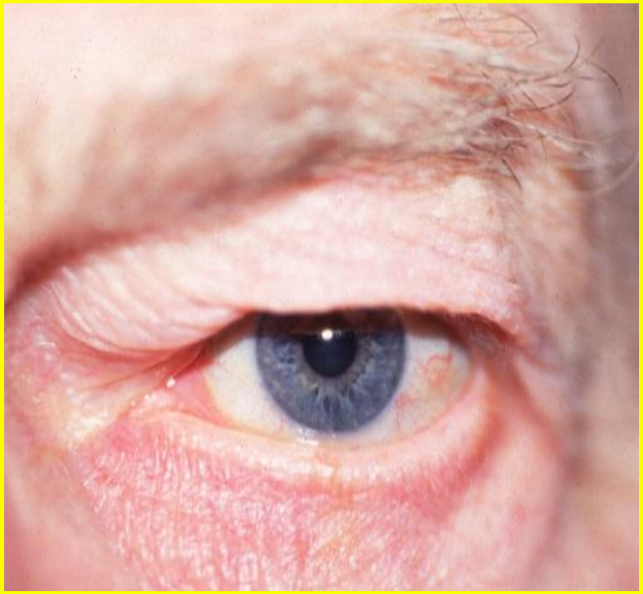
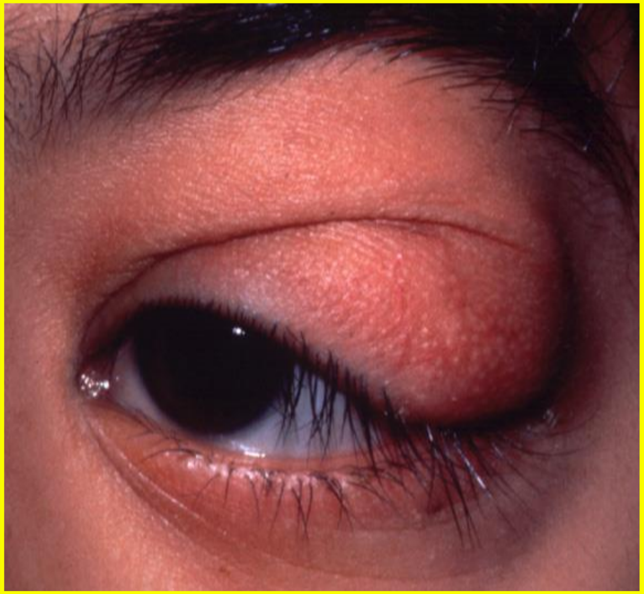
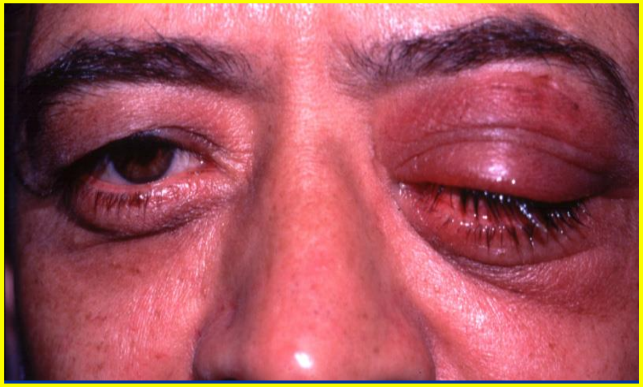
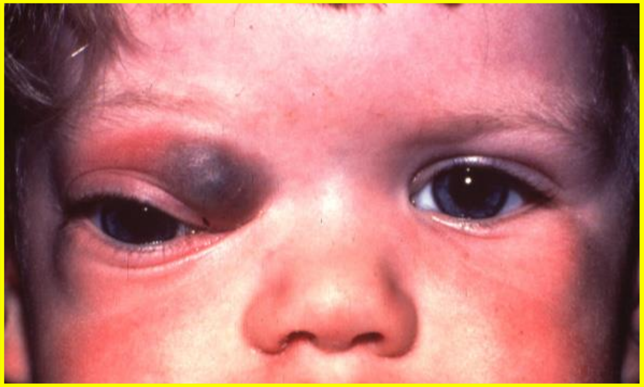


Absent upper lid crease



Deep sulcus

Mechanical Ptosis

Causes	
	
Dermatochalasis	Large tumours
	
Severe lid oedema	Anterior orbital lesions

Lacrimal System & ORBIT

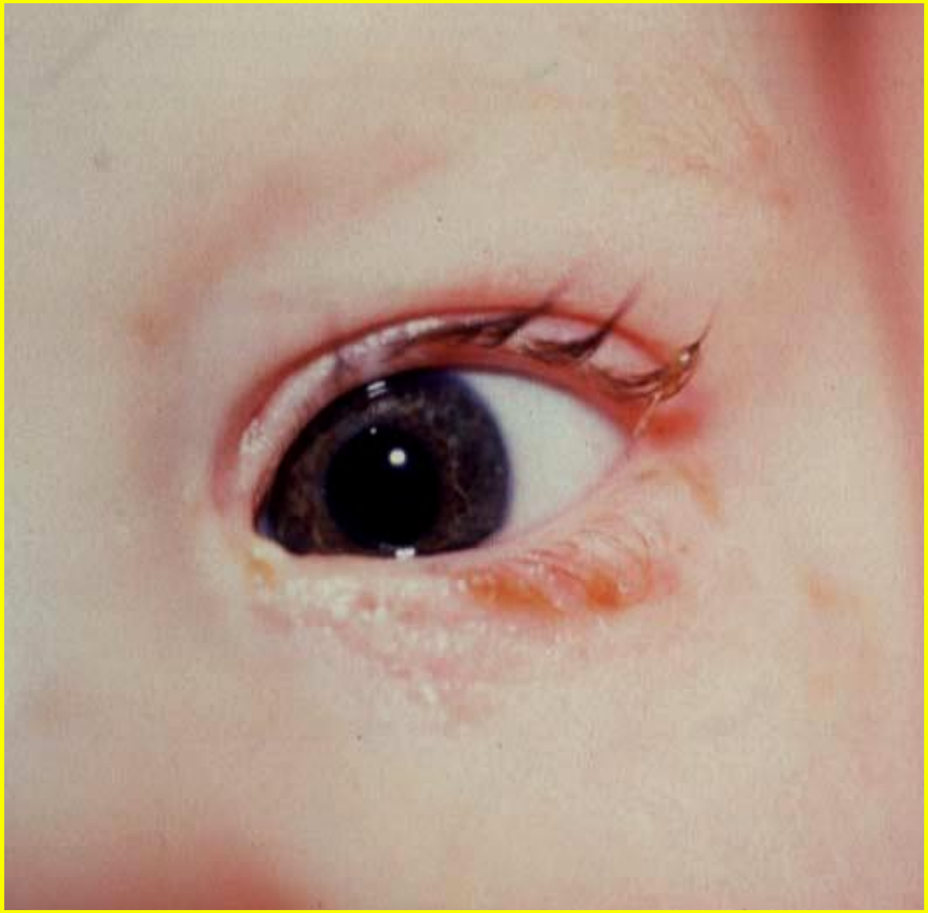
INFECTIONS OF LACRIMAL PASSAGES

1. Congenital nasolacrimal duct obstruction

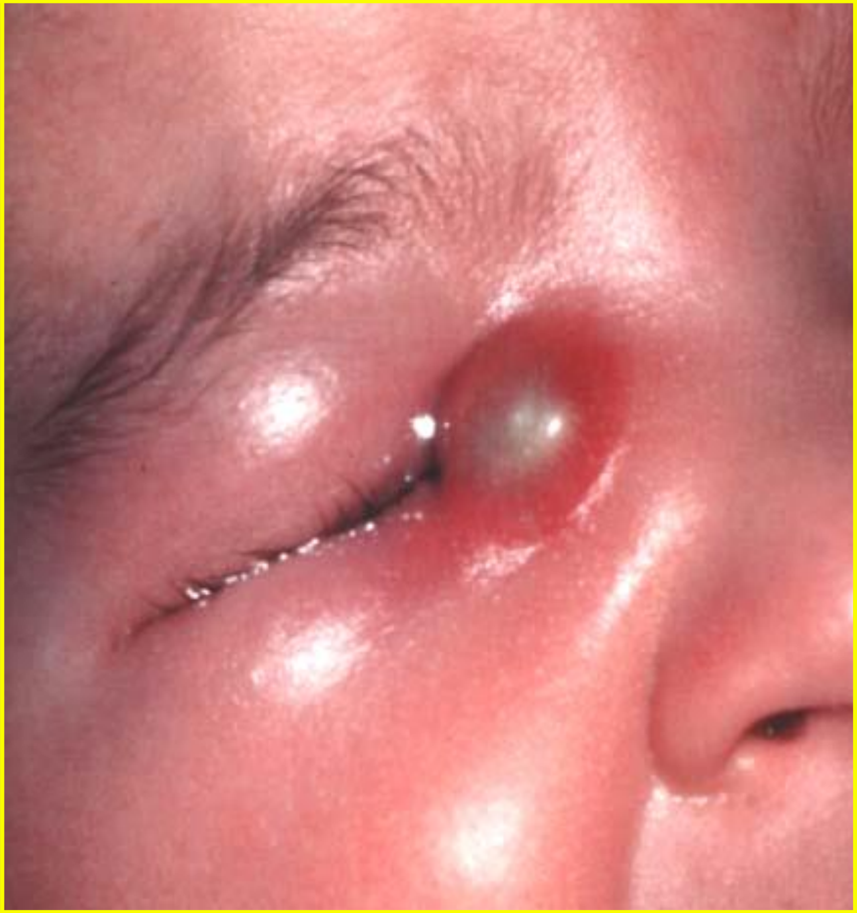
2. Dacryocystitis
    - Acute
    - Chronic

Congenital nasolacrimal duct obstruction

Caused by delayed canalization near valve of Hasner•
On pressure reflux of purulent material from punctum•



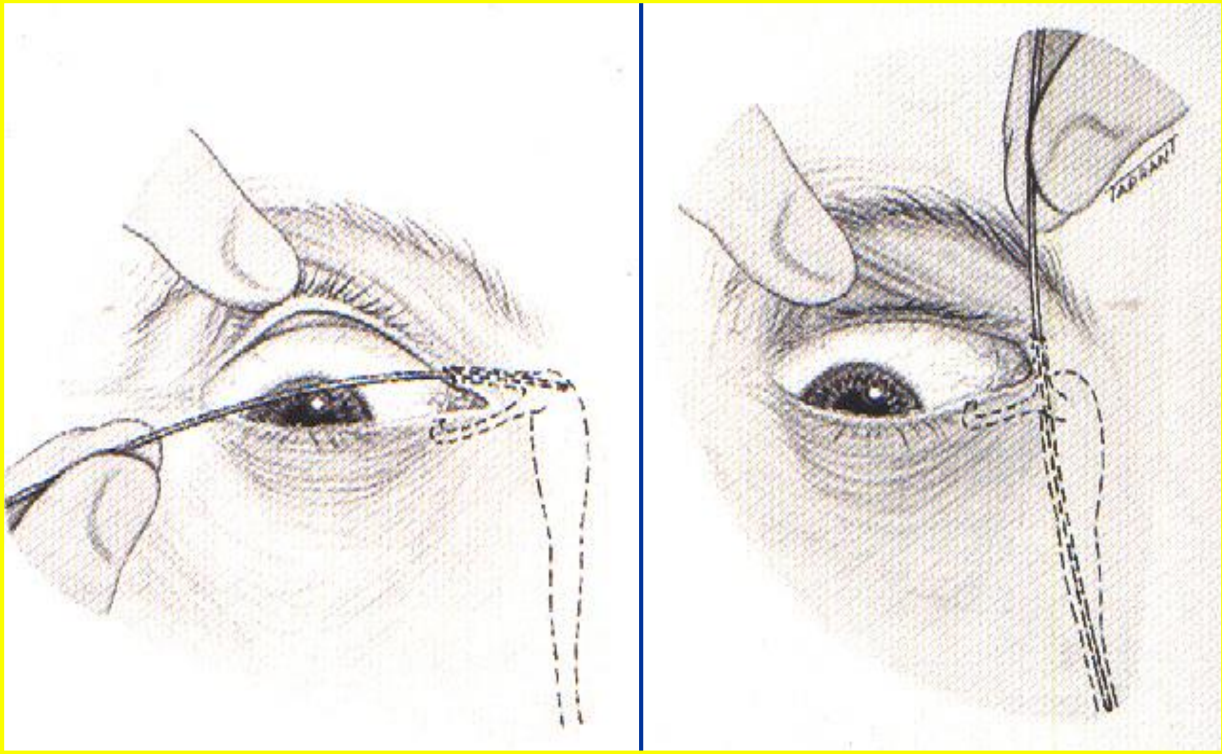
Epiphora and matting



Infrequently acute dacryocystitis

Treatment of congenital nasolacrimal duct obstruction

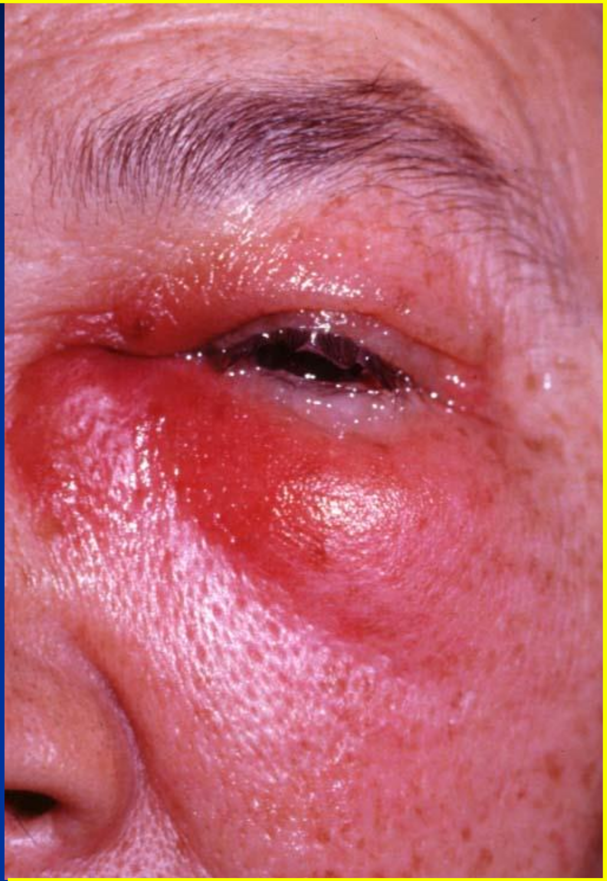
- Massage of nasolacrimal duct and antibiotic drops 4 times daily
- Improvement by age 12 months in 95% of cases



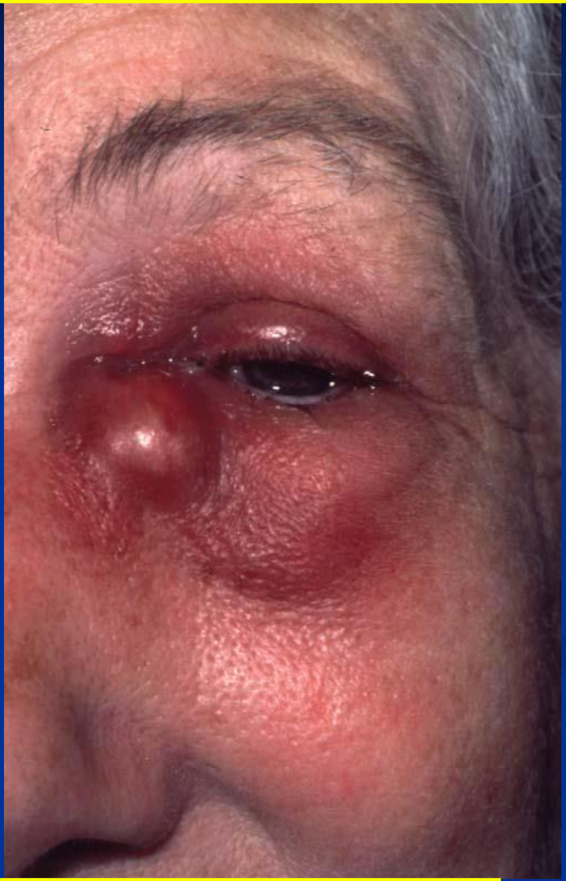
- If no improvement - probe at 12-18 months
- Results - 90% cure by first probing and 6% by second

Acute dacryocystitis

Usually secondary to nasolacrimal duct obstruction



- Tender canthal swelling
- Mild preseptal cellulitis



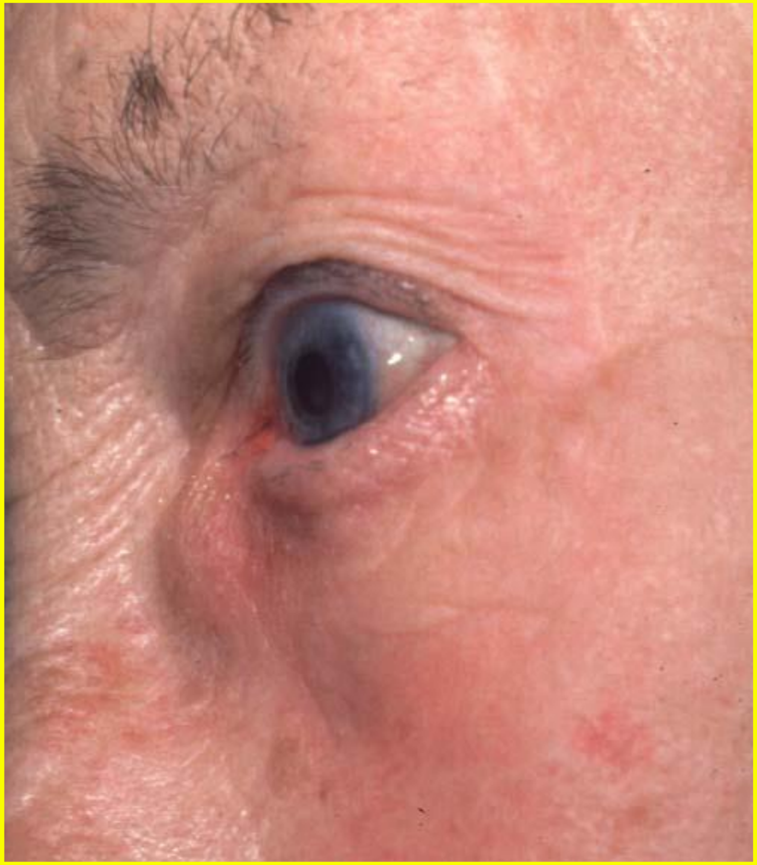
- May develop into abscess

Treatment

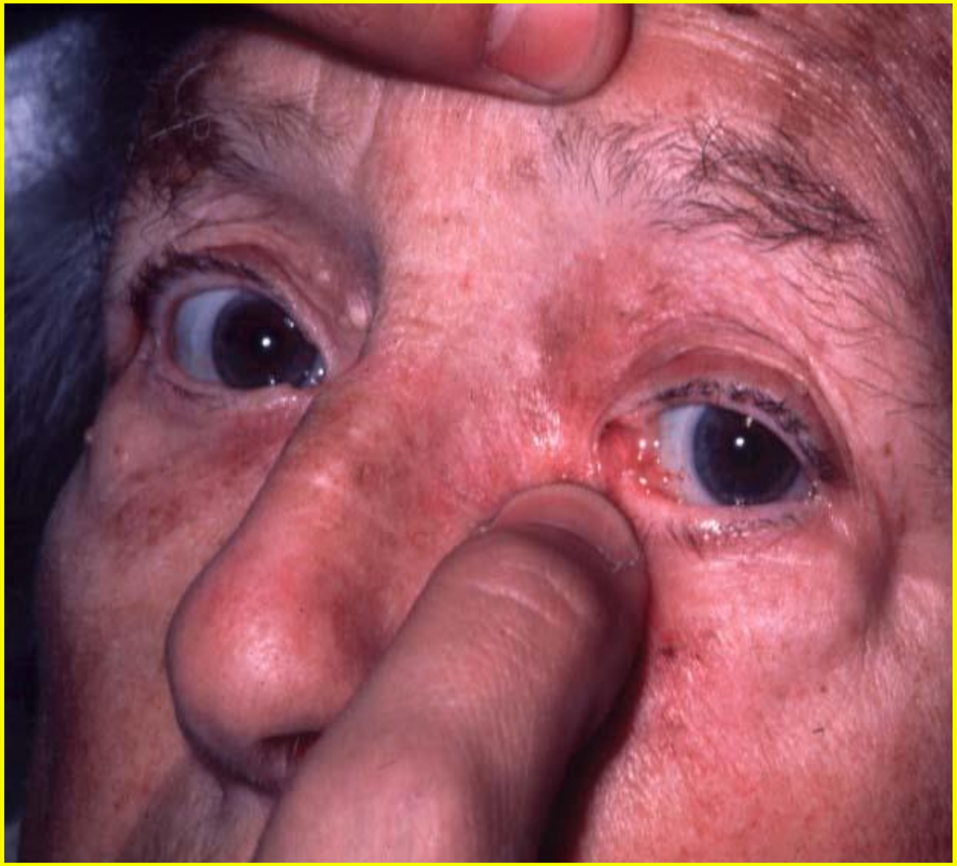
- Systemic antibiotics and warm compresses
- DCR after acute infection is controlled

Chronic dacryocystitis

Epiphora and chronic or recurrent unilateral conjunctivitis



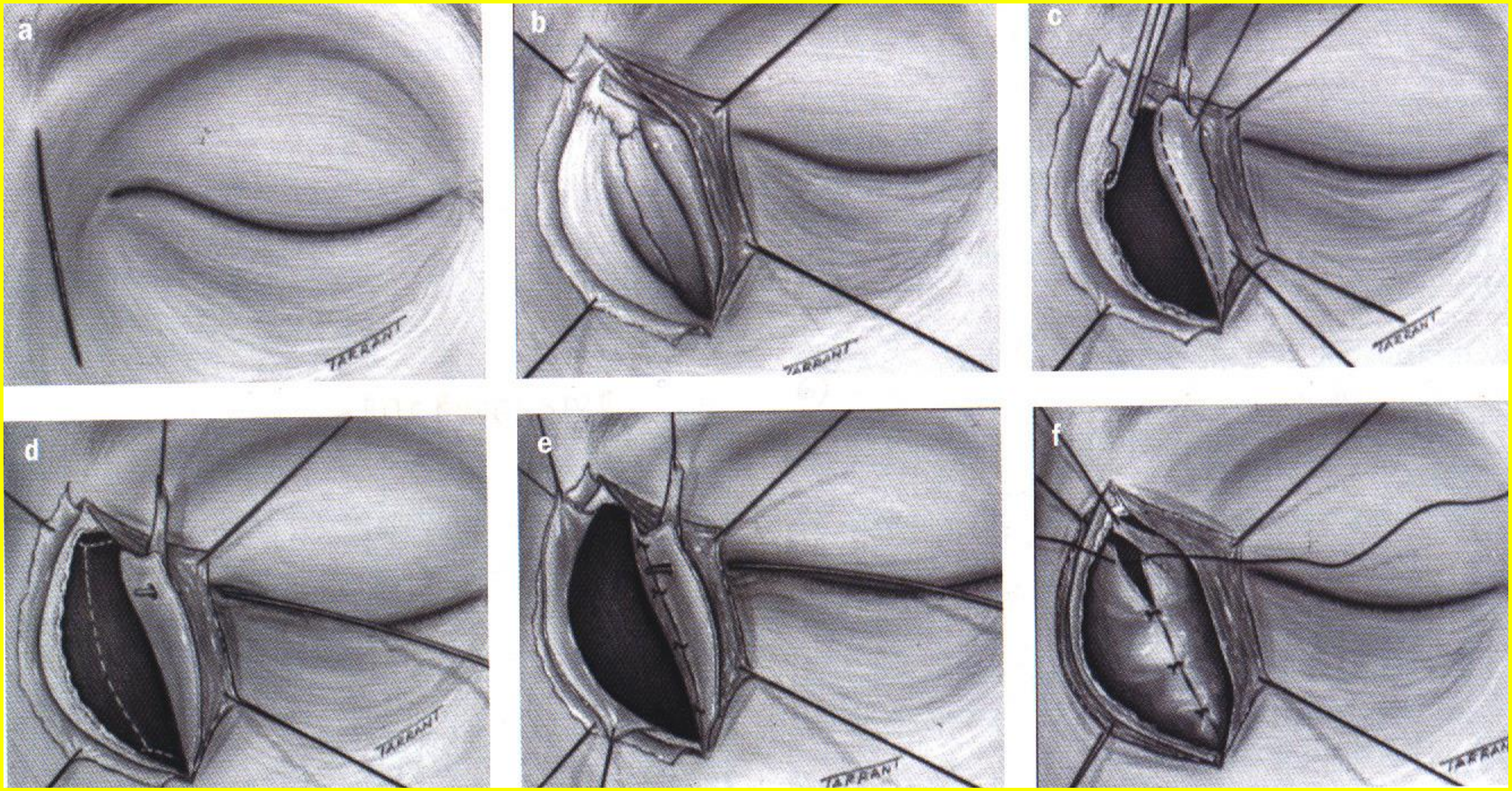
Painless swelling at inner canthus



Expressed mucopurulent material

Treatment - **DCR**

Dacryocystorhinostomy


a
b
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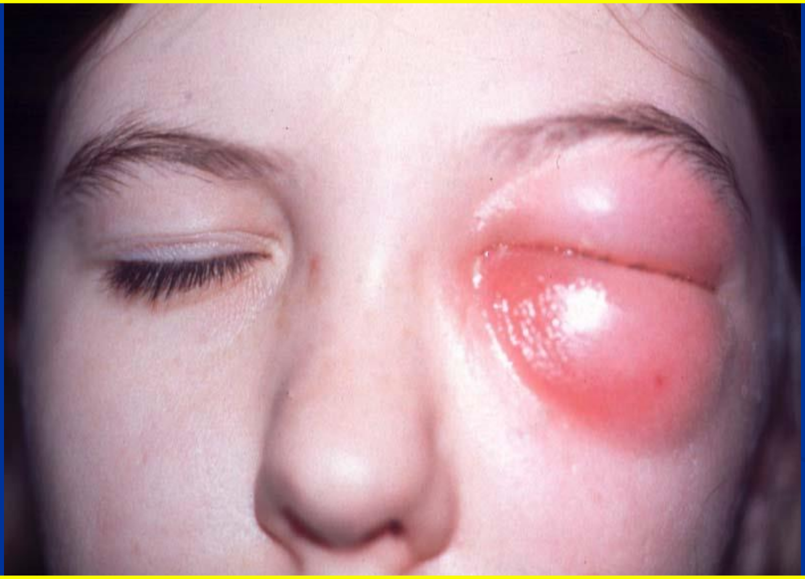
Orbital cellulitis

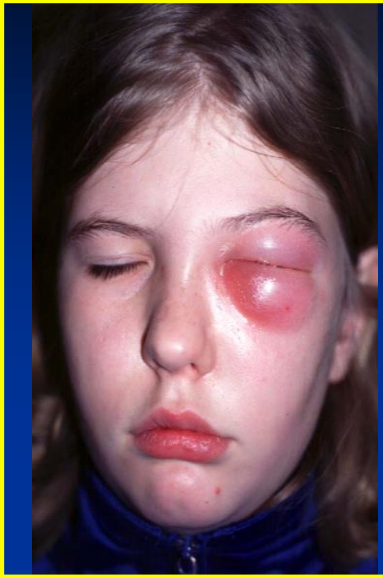
- Infection behind orbital septum
- Usually secondary to ethmoiditis
- Presentation - severe malaise, fever and orbital signs

Signs

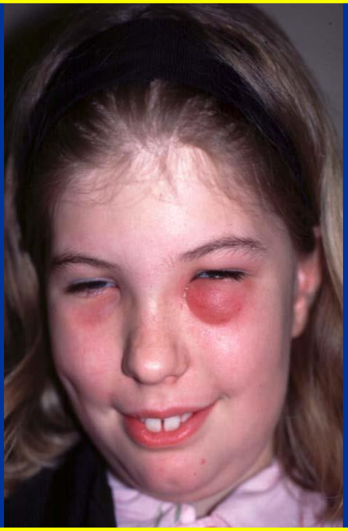


- Severe eyelid oedema and redness
- Proptosis - most frequently lateral and down
- Painful ophthalmoplegia
- Optic nerve dysfunction if advanced

Management of orbital cellulitis



Pre-treatment



Post-treatment

1. Hospital admission

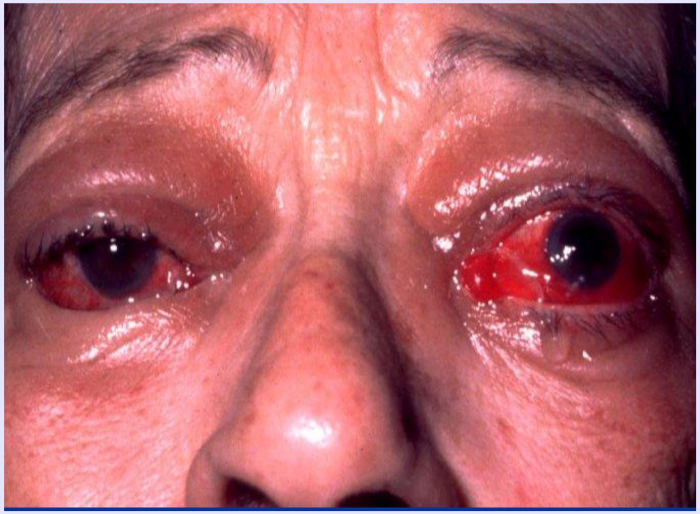
2. Systemic antibiotic therapy

3. Monitoring of optic nerve function

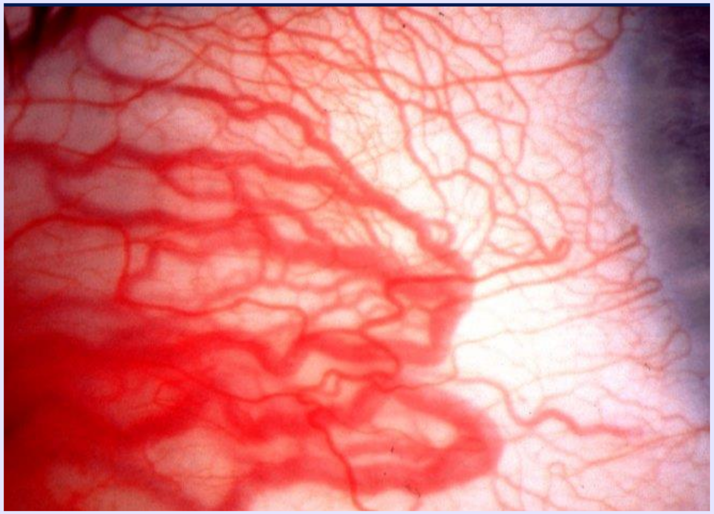
4. Indications for surgery
   - Resistance to antibodies
   - Orbital or subperiosteal abscess
   - Optic neuropathy

Thyroid Ophthalmopathy

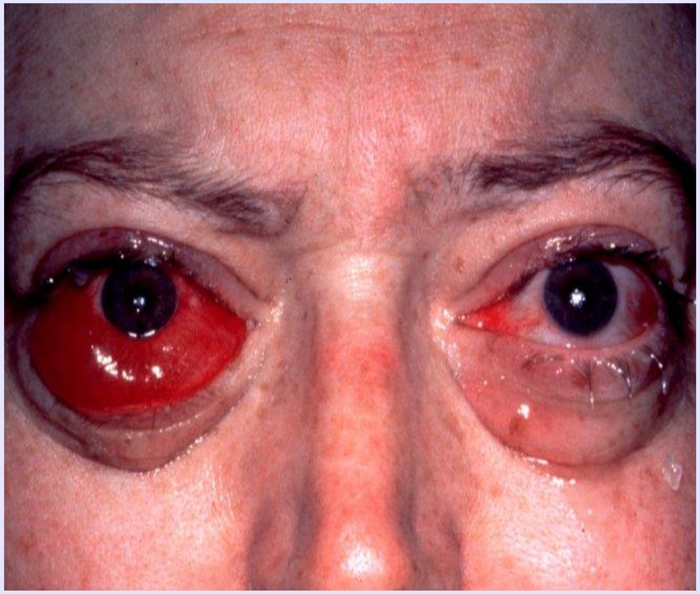
Periorbital and lid swelling



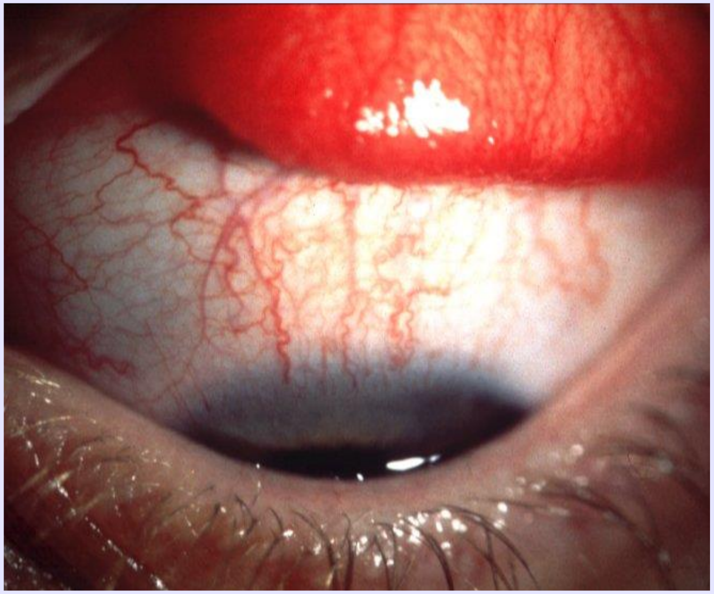
Conjunctival hyperaemia



Chemosis

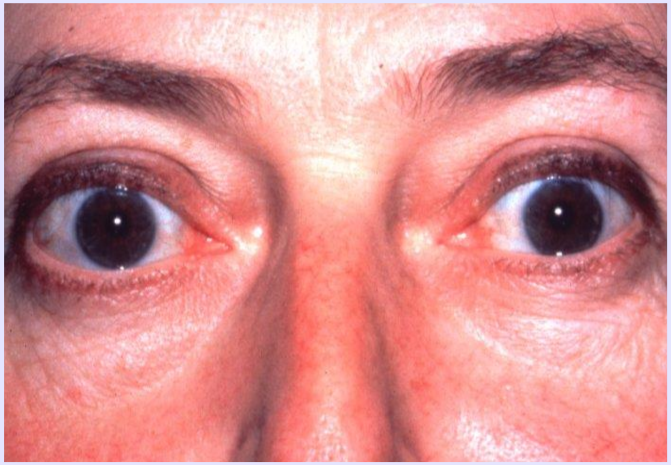


Superior limbic keratoconjunctivitis

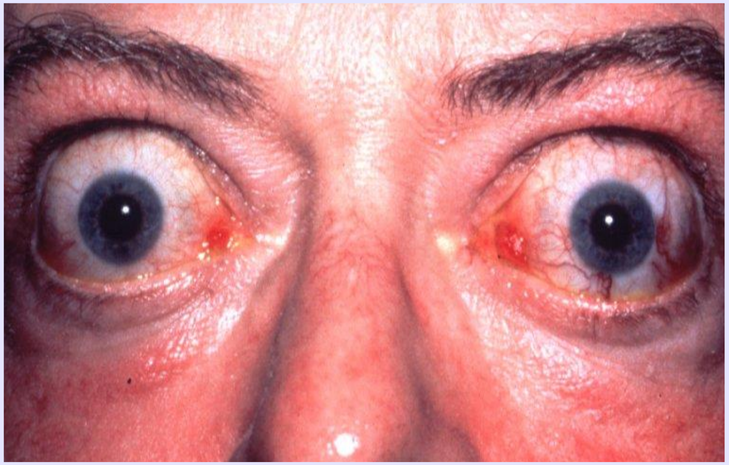


Signs of eyelid retraction

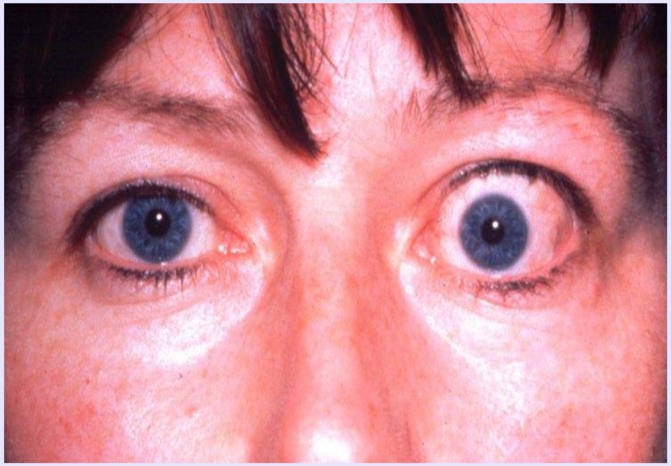
Occurs in about 50%



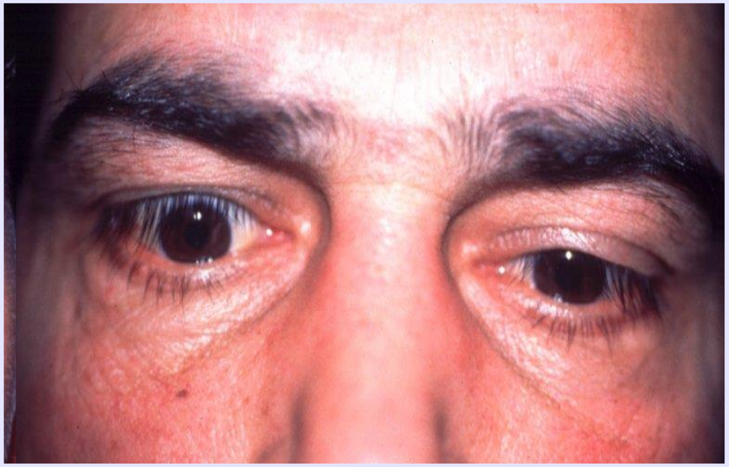
- Bilateral lid retraction
- No associated proptosis



- Bilateral lid retraction
- Bilateral proptosis



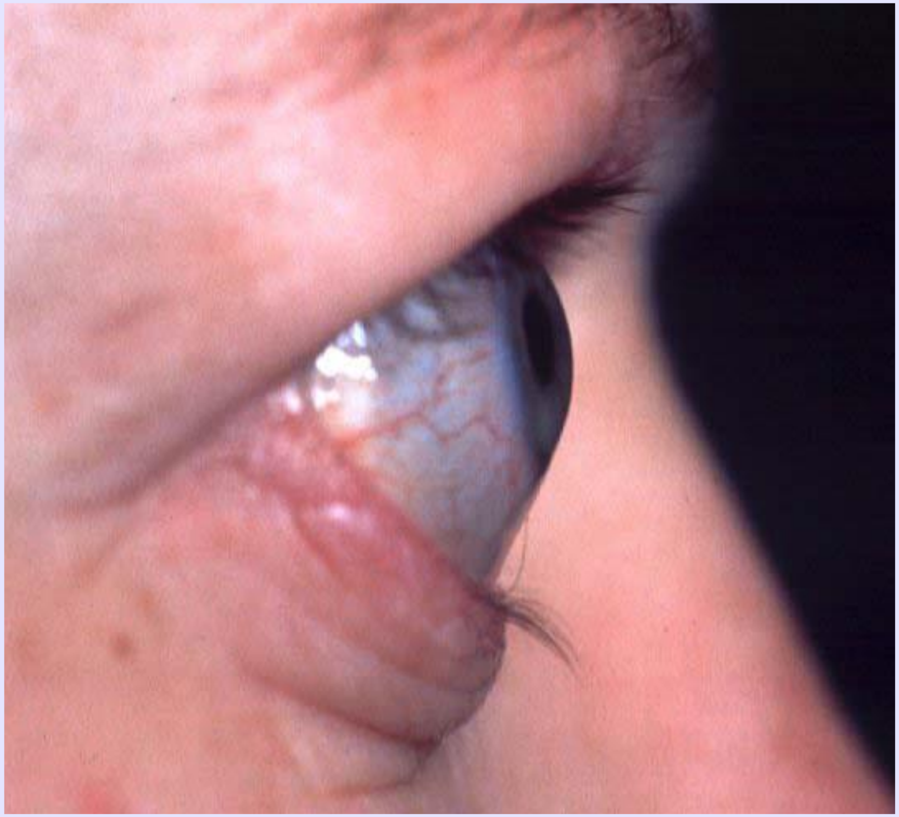
- Unilateral lid retraction
- Unilateral proptosis



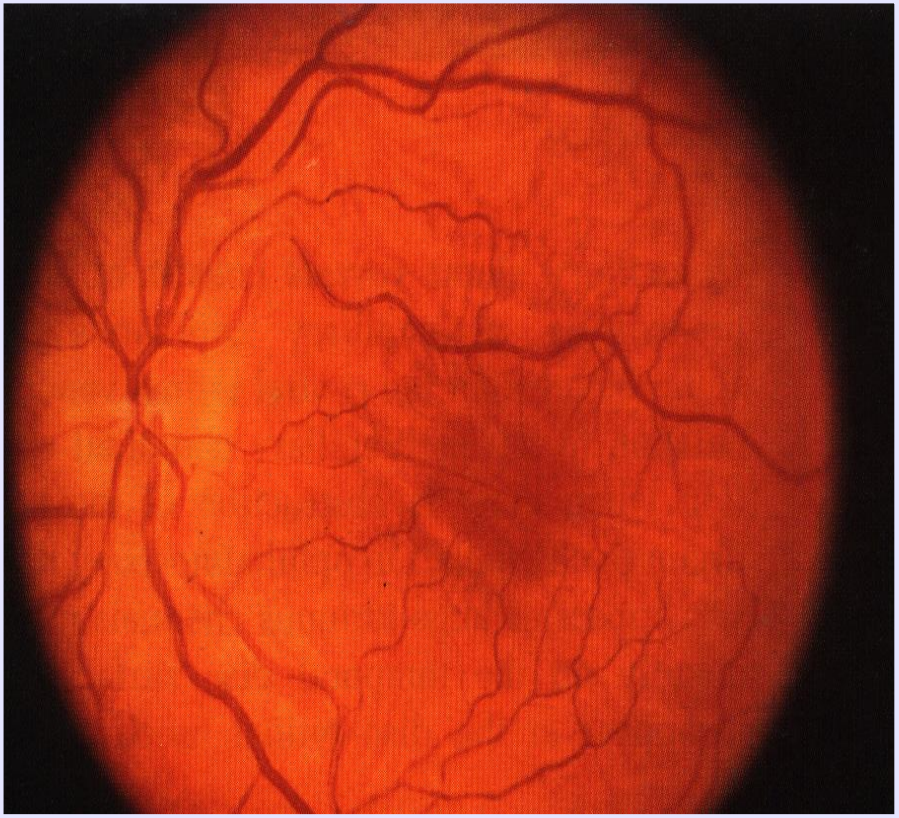
- Lid lag in downgaze

Proptosis

- Occurs in about 50%
- Uninfluenced by treatment of hyperthyroidism



Axial and permanent in about 70%



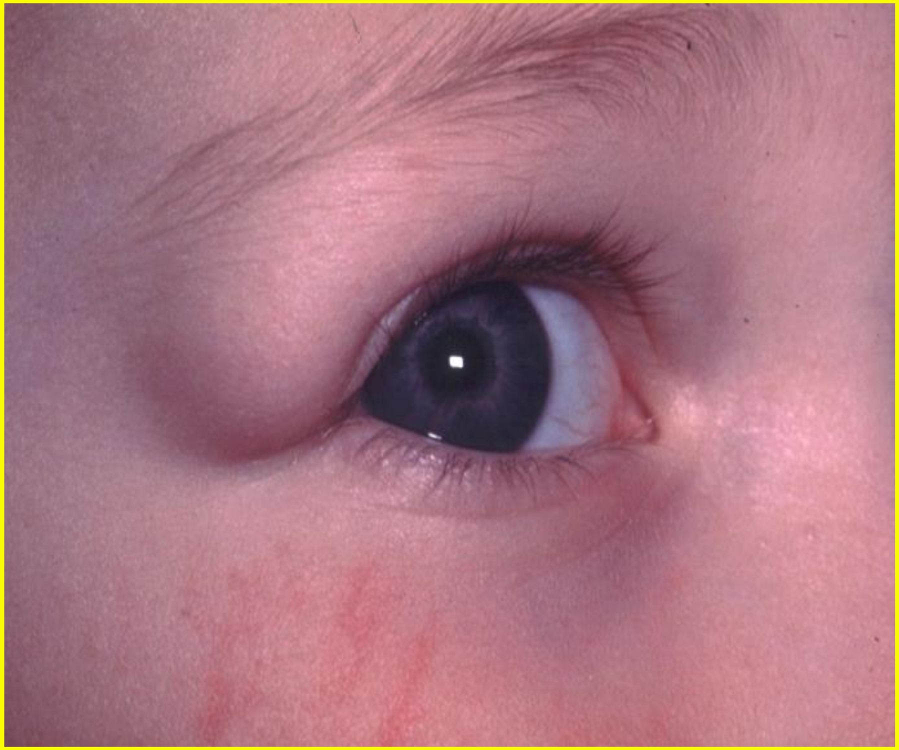
May be associated with choroidal folds

Treatment options

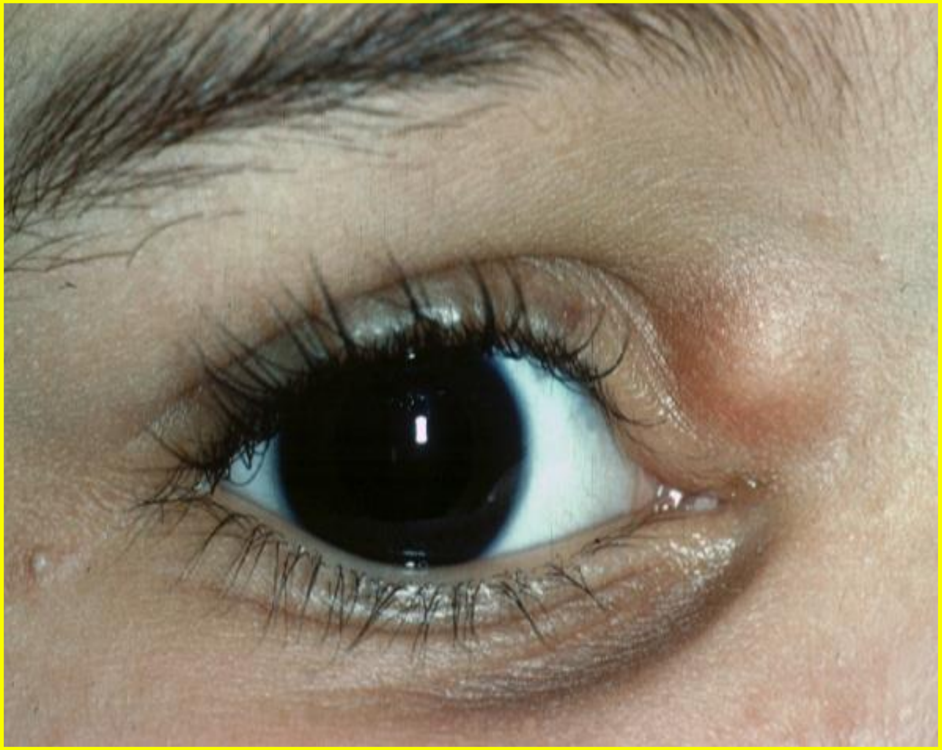
- Systemic steroids
- Radiotherapy
- Surgical decompression

Superficial dermoid cyst

- Presents in infancy
- No displacement of globe



- Most commonly superotemporal
- Freely mobile under skin



- Occasionally superonasal
- Posterior margins are easily palpable

CONJUNCTIVA

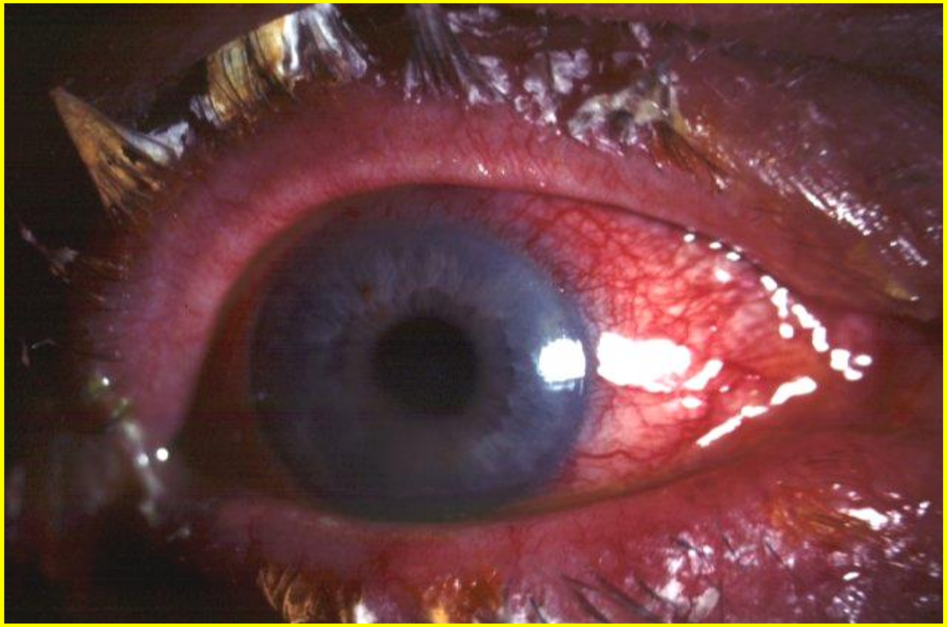
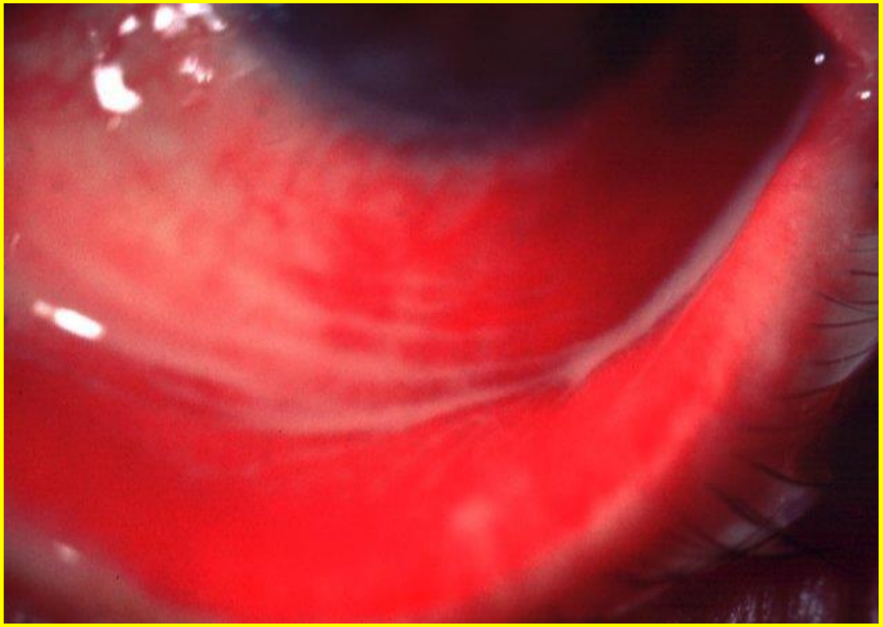
CONJUNCTIVAL INFECTIONS

1. **Bacterial**
   - Simple bacterial conjunctivitis
   - Gonococcal keratoconjunctivitis

2. **Viral**
   - Adenoviral keratoconjunctivitis
   - Molluscum contagiosum conjunctivitis
   - Herpes simplex conjunctivitis

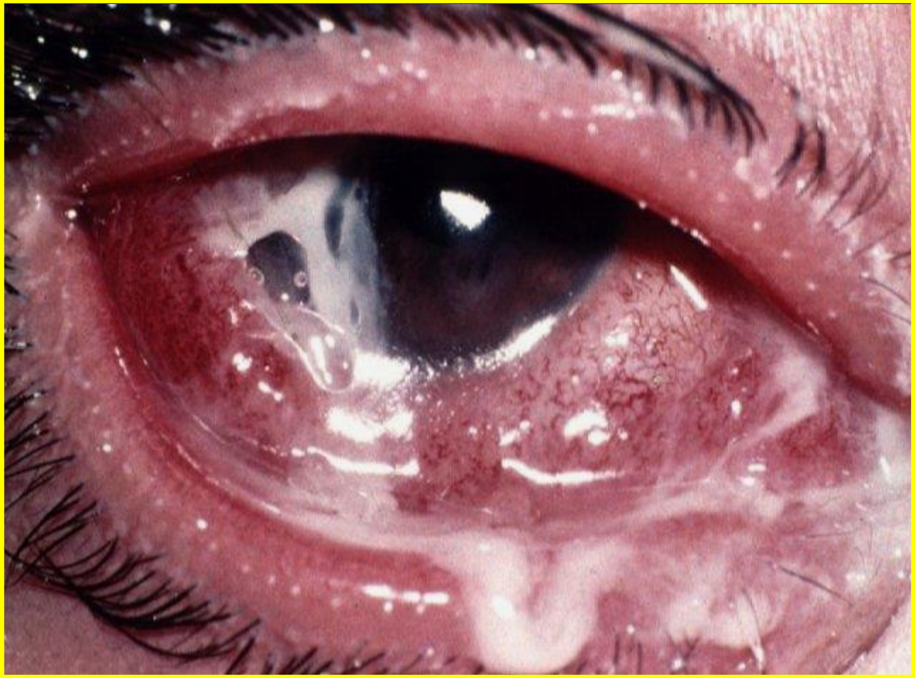
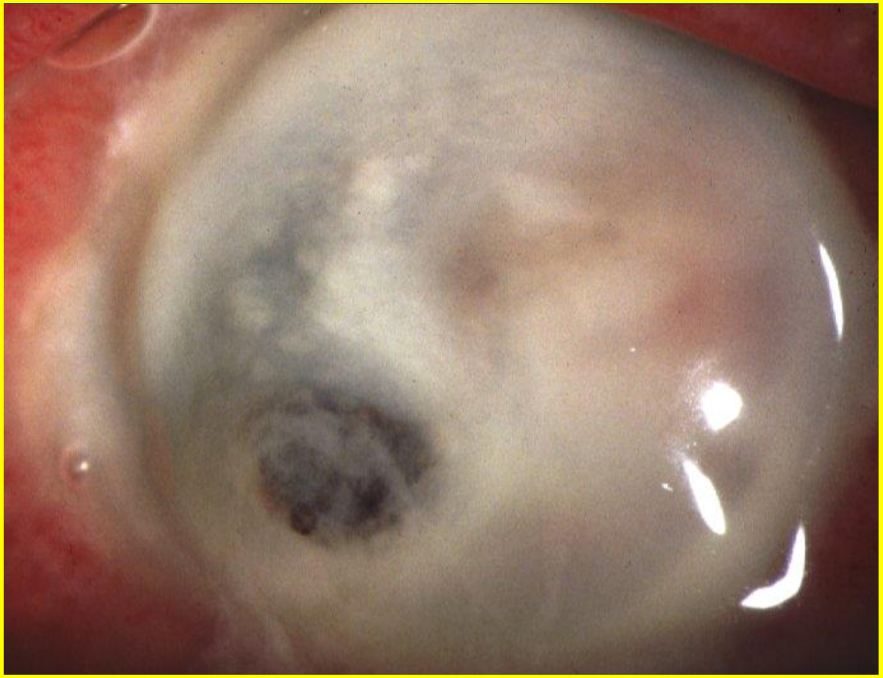
3. **Chlamydial**
   - Adult chlamydial keratoconjunctivitis
   - Neonatal chlamydial conjunctivitis
   - Trachoma

Simple bacterial conjunctivitis

Signs	
	
Crusted eyelids and conjunctival injection	**Subacute onset of mucopurulent discharge**

Treatment - broad-spectrum topical antibiotics

Gonococcal keratoconjunctivitis

Signs	Complications
	
Acute, profuse, purulent discharge, hyperaemia and chemosis	Corneal ulceration, perforation and endophthalmitis if severe

Treatment

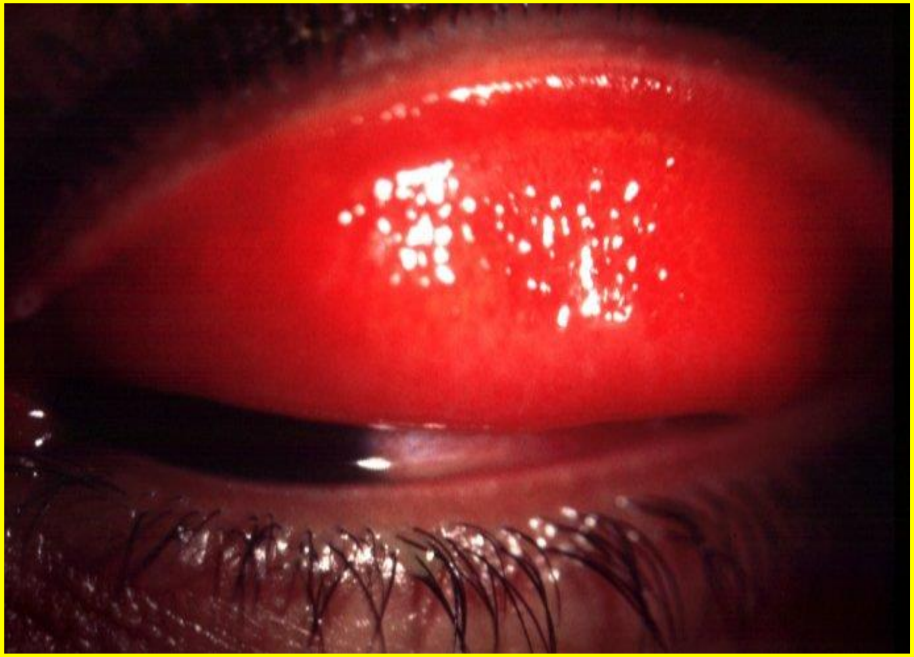
- Topical gentamicin and bacitracin
- Intravenous cefoxitin or cefotaxime

Adenoviral Keratoconjunctivitis

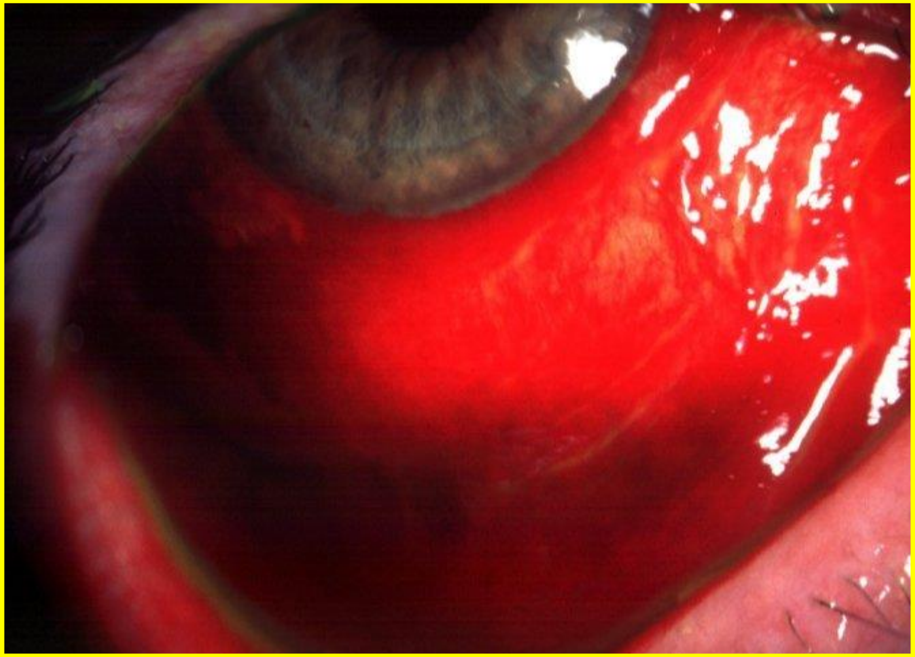
1. **Pharyngoconjunctival fever**
   - Adenovirus types 3 and 7
   - Typically affects children
   - Upper respiratory tract infection
   - Keratitis in 30% - usually mild

2. **Epidemic keratoconjunctivitis**
   - Adenovirus types 8 and 19
   - Very contagious
   - No systemic symptoms
   - Keratitis in 80% of cases - may be severe

Signs of conjunctivitis



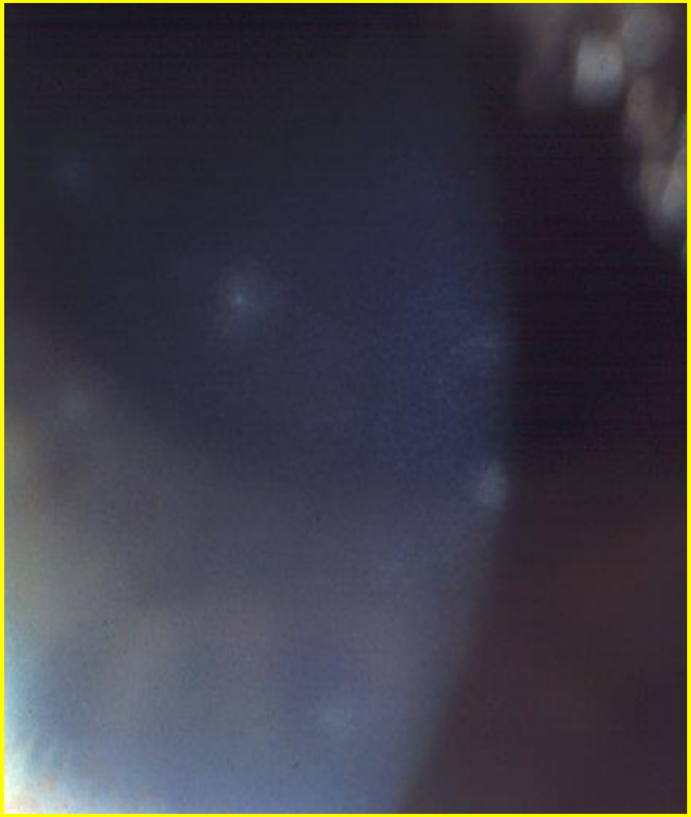
Usually bilateral, acute watery discharge and follicles



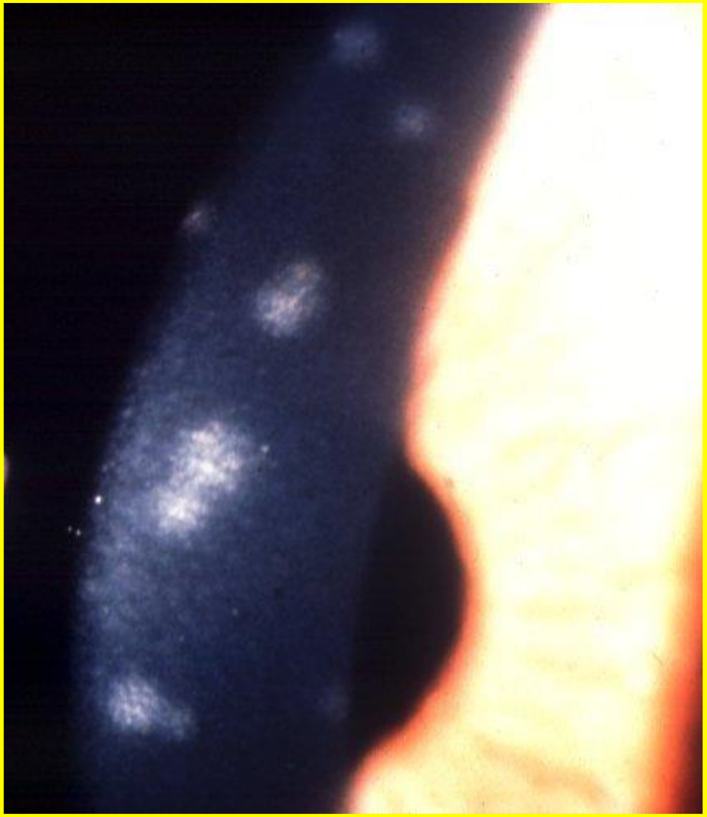
Subconjunctival haemorrhages and pseudomembranes if severe

Treatment - symptomatic

Signs of keratitis



- Focal, epithelial keratitis
  - Transient

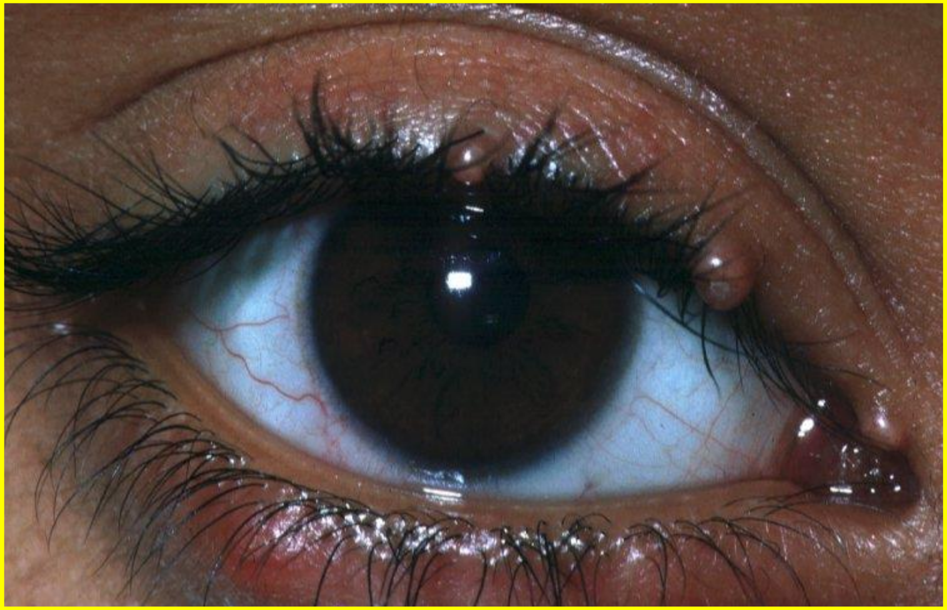


- Focal, subepithelial keratitis
- May persist for months

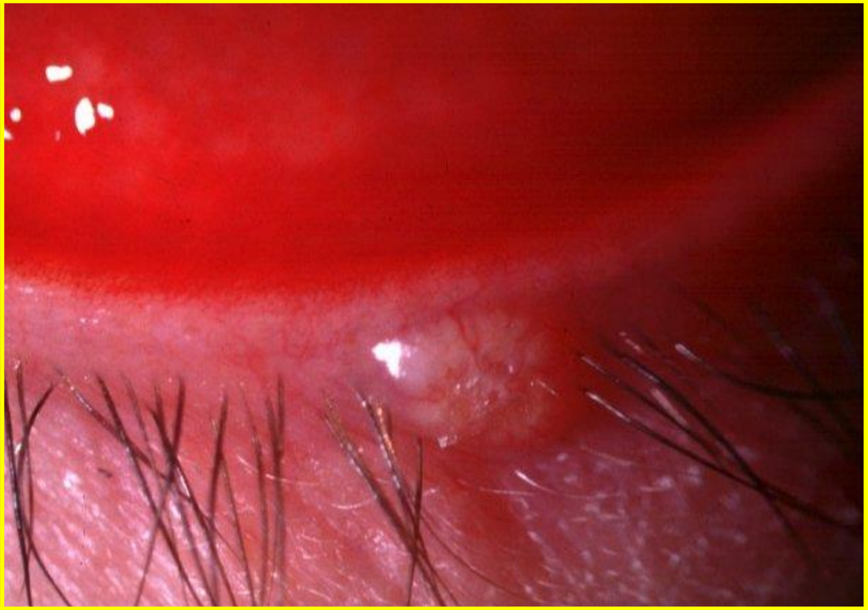
Treatment - topical steroids if visual acuity diminished by subepithelial keratitis

Molluscum contagiosum conjunctivitis

Signs



- Waxy, umbilicated eyelid nodule
  - May be multiple

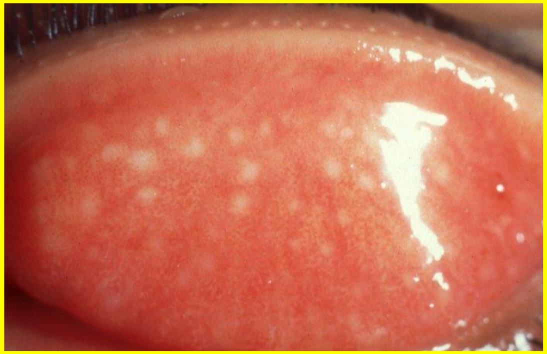
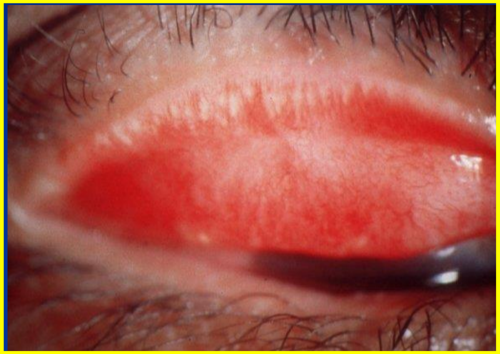
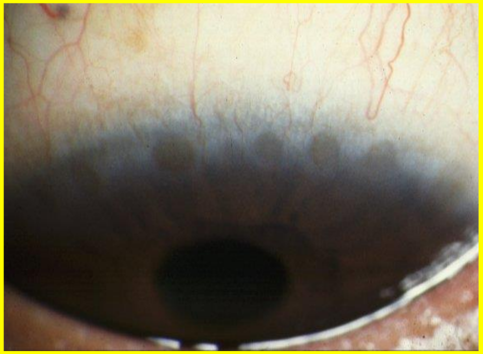
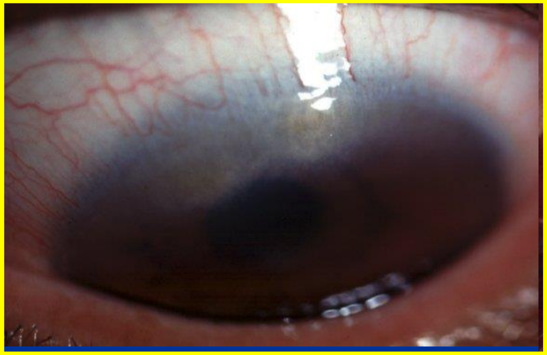
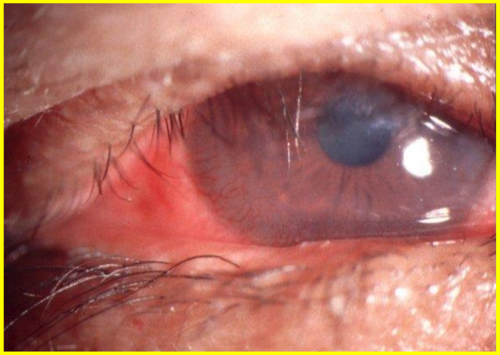
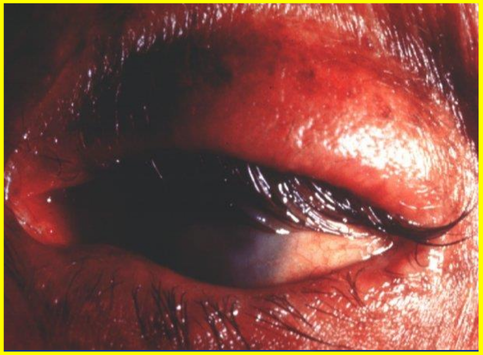


- Ispilateral, chronic, mucoid discharge
  - Follicular conjuntivitis

Treatment - destruction of eyelid lesion

Trachoma

- Infection with serotypes A, B, Ba and C of *Chlamydia trachomatis*
- Fly is major vector in infection-reinfection cycle

Progression		
		
Acute follicular conjunctivis	Conjunctival scarring (Arlt line)	Herbert pits
		
Pannus formation	Trichiasis	Cicatricial entropion

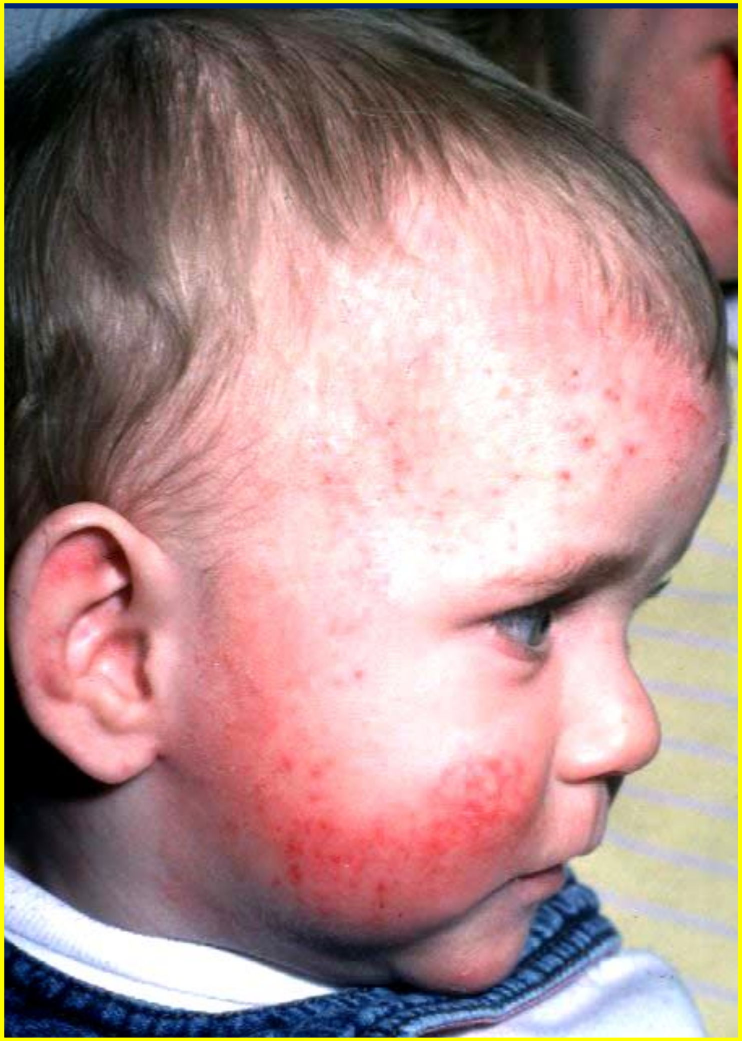
Treatment - systemic Azithromycin

ALLERGIC CONJUNCTIVITIS

1. Vernal keratoconjunctivitis
2. Atopic keratoconjunctivitis

Vernal keratoconjunctivitis

Frequently associated with atopy: asthma, hay fever and dermatitis



- **Recurrent, bilateral**
- **Affects children and young adults**

More common in males and in warm climates

Itching, mucoid discharge and lacrimation

Types

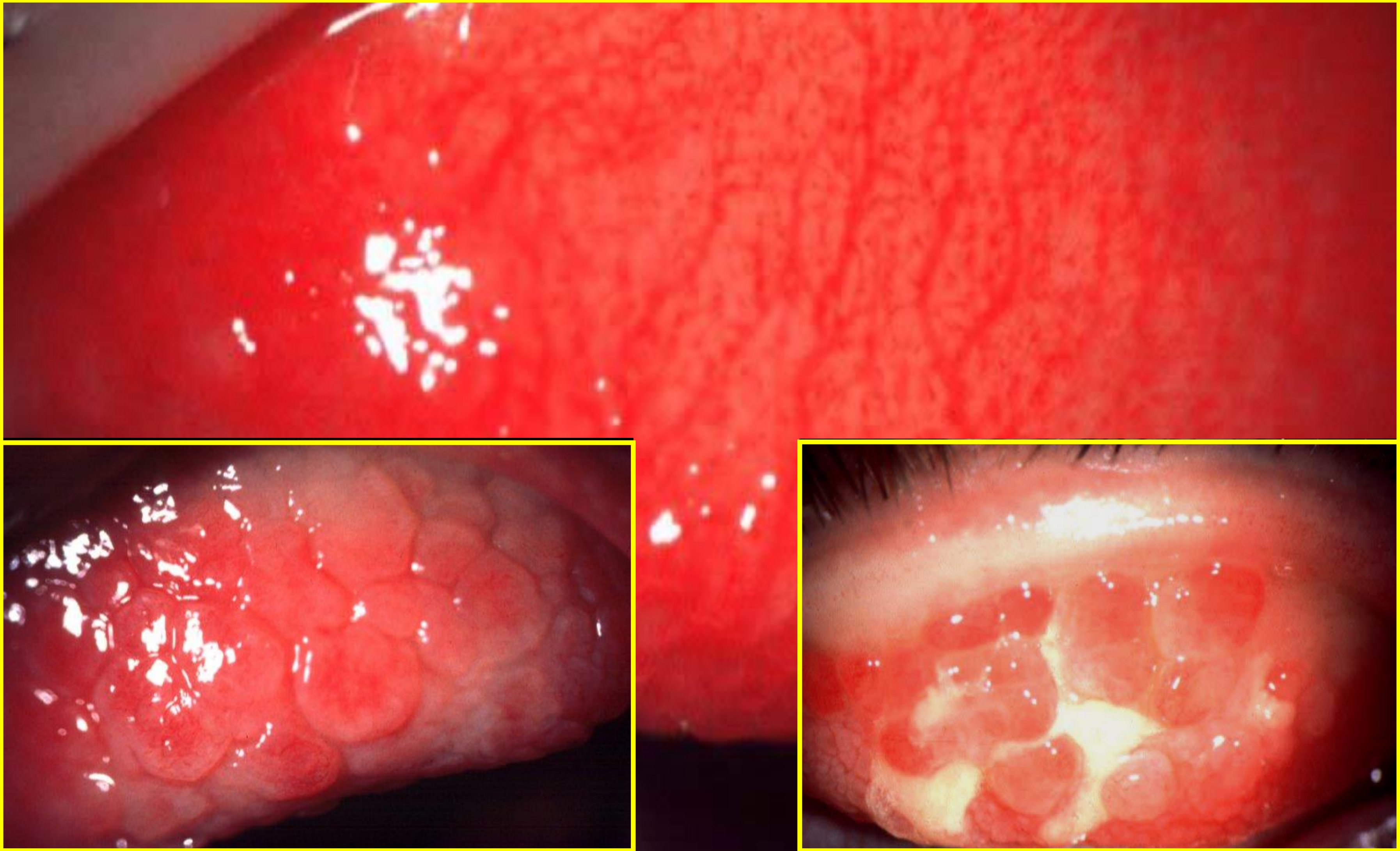
- **Palpebral**
- **Limbal**
- **Mixed**

Treatment

- **Topical mast cell stabilizers**
- **Topical steroids**

Progression of vernal conjunctivitis

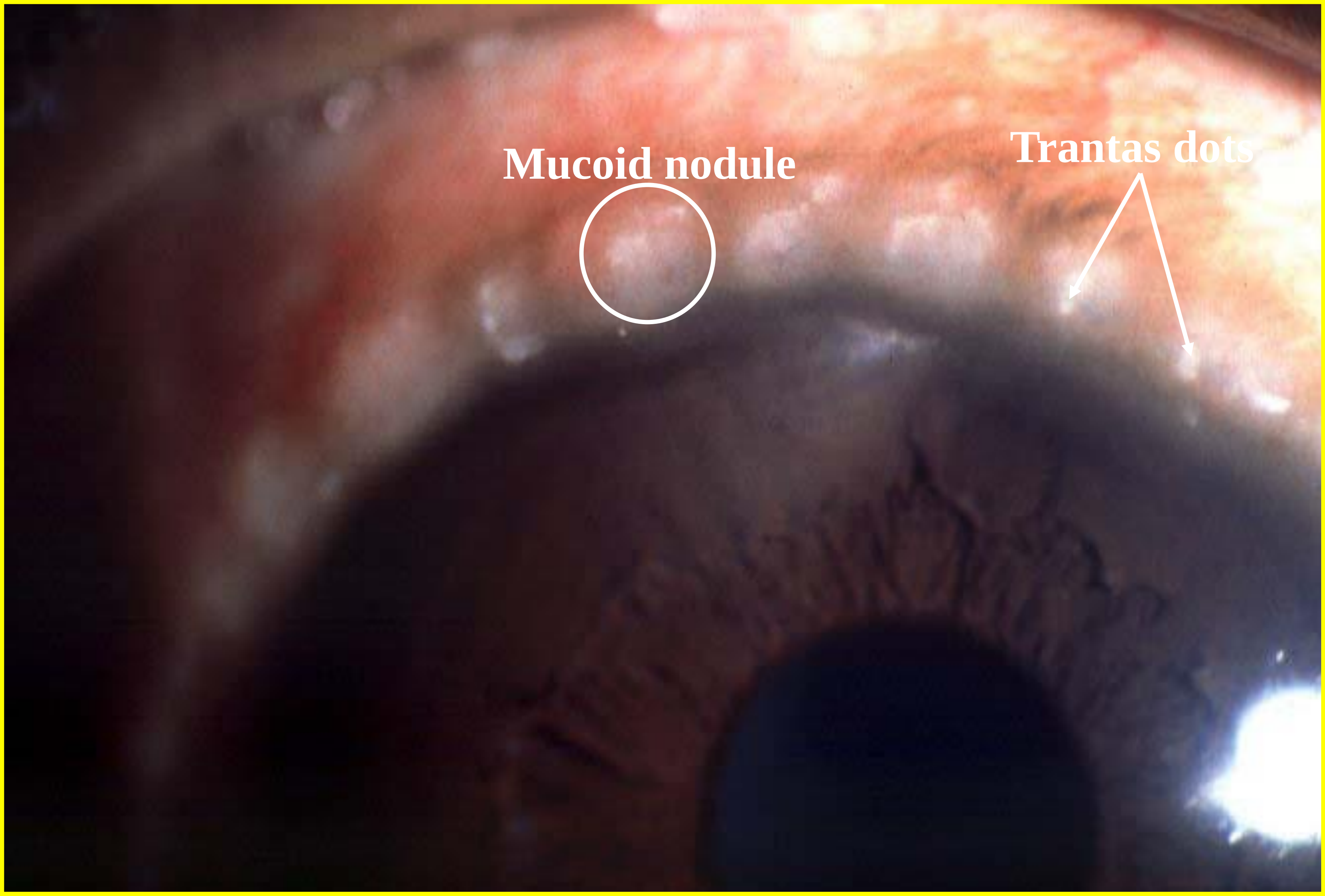
Diffuse papillary hypertrophy, most marked on superior tarsus



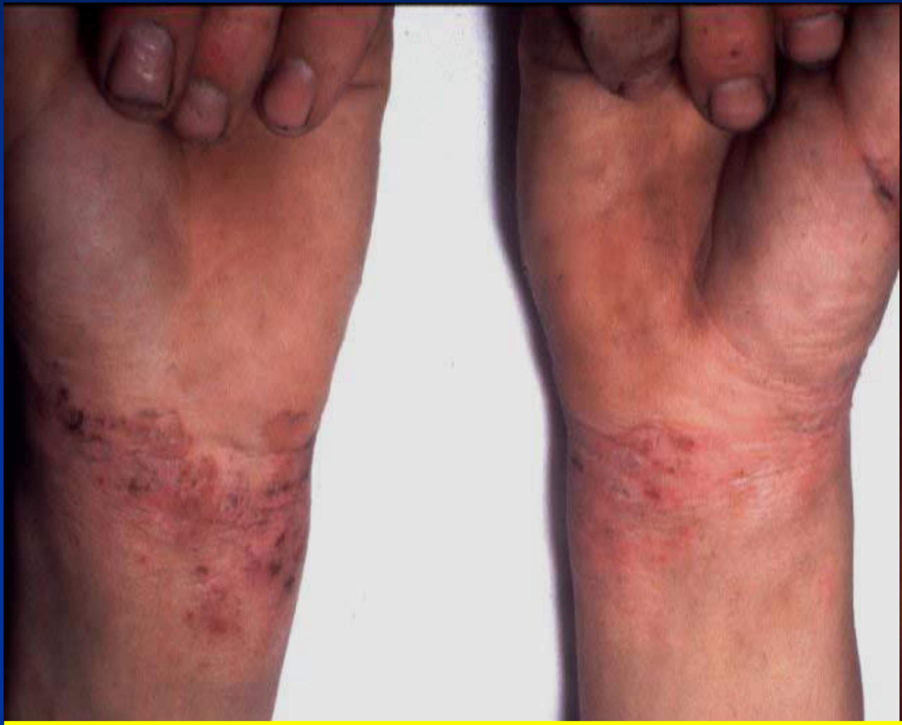
Formation of cobblestone papillae

Rupture of septae - giant papil

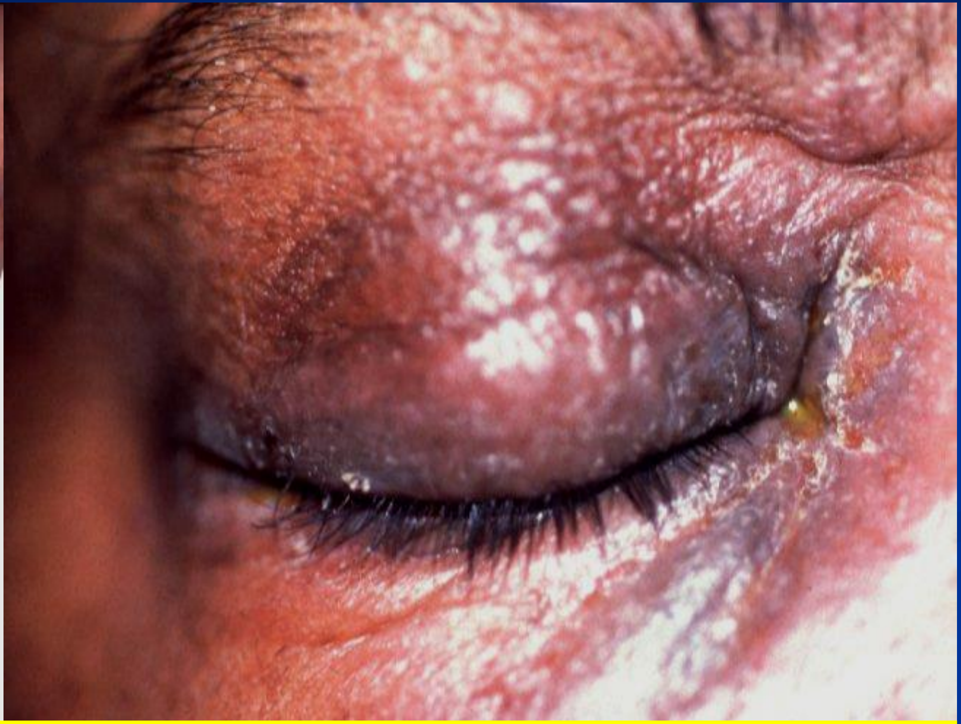
Limbal vernal


Mucoid nodule
Trantas dots

Atopic keratoconjunctivitis



Typically affects young patients with atopic dermatitis



Eyelids are red, thickened, macerated and fissured

CONJUNCTIVAL TUMOURS

1. Benign

- Naevus
- Papilloma
- Epibulbar dermoid
- Lipodermoid

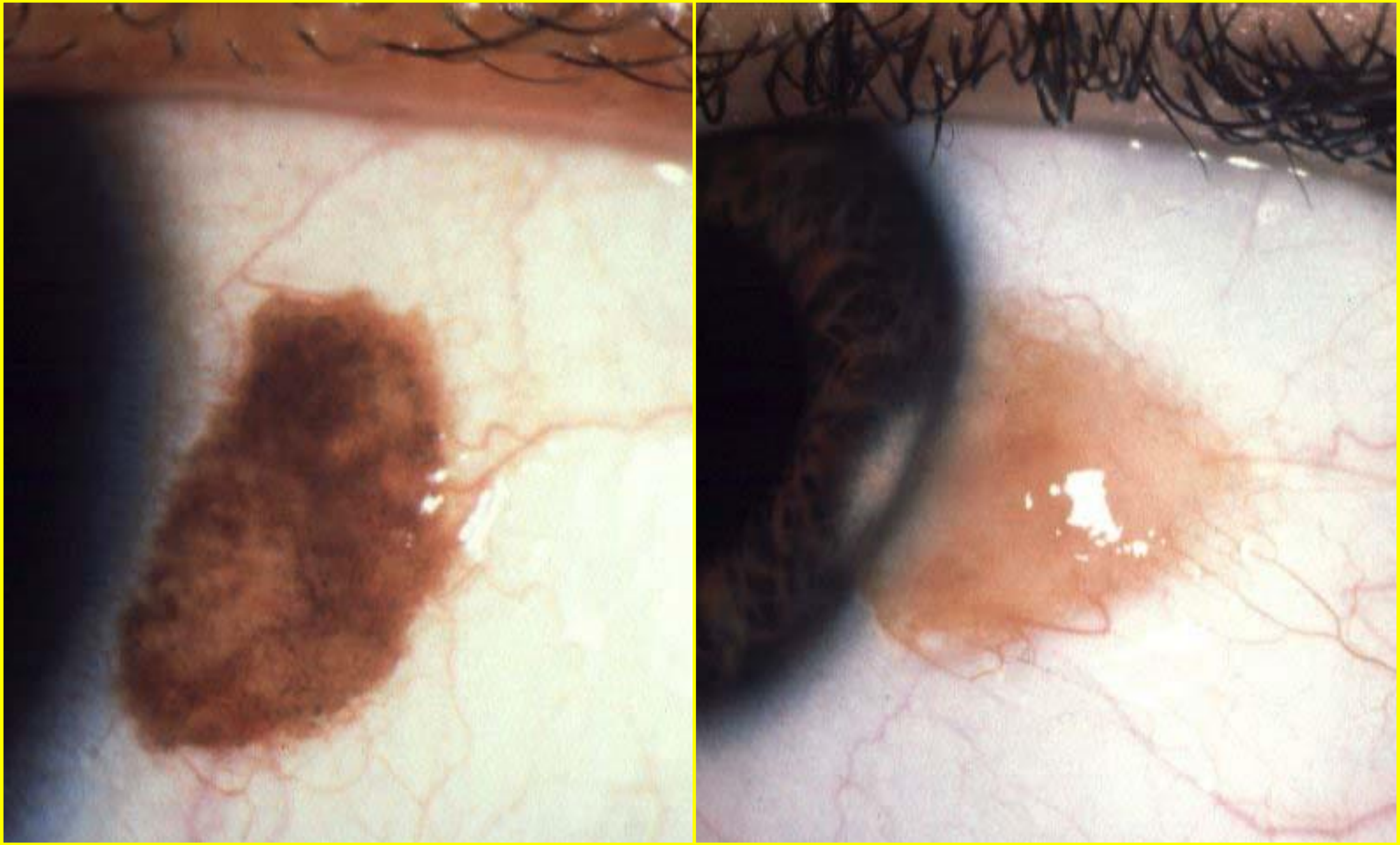
2. Pre-malignant

- Primary acquired melanosis (PAM)
- Intraepithelial neoplasia (carcinoma *in situ*)

3. Malignant

- Melanoma
- Squamous cell carcinoma
- Kaposi sarcoma

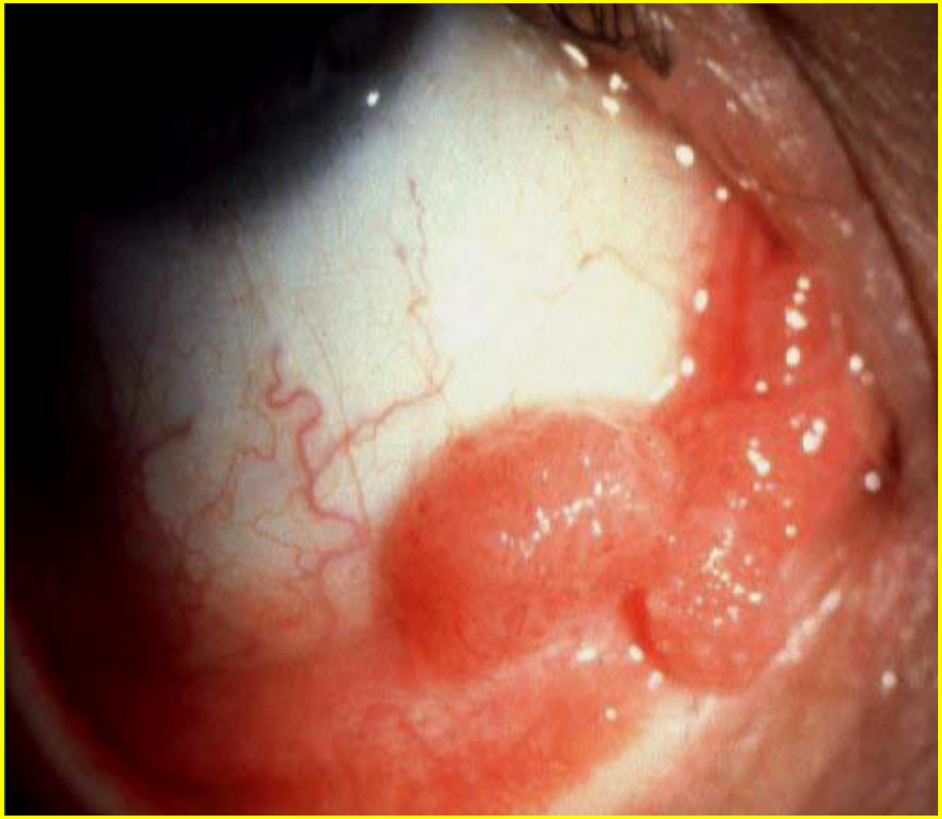
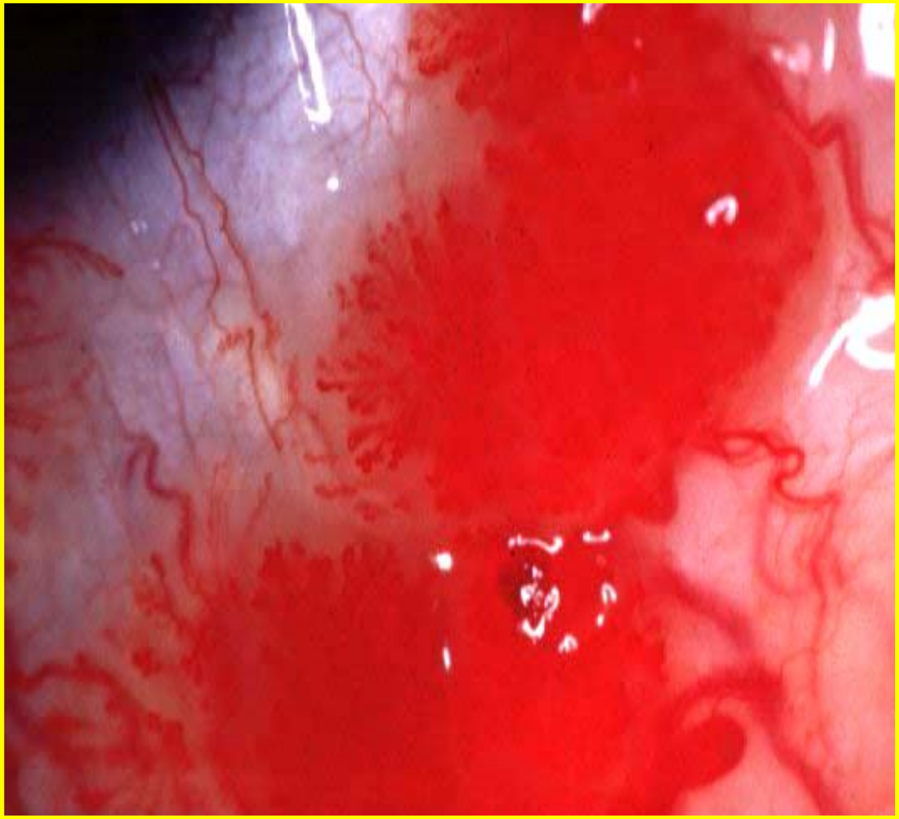
Conjunctival Naevus



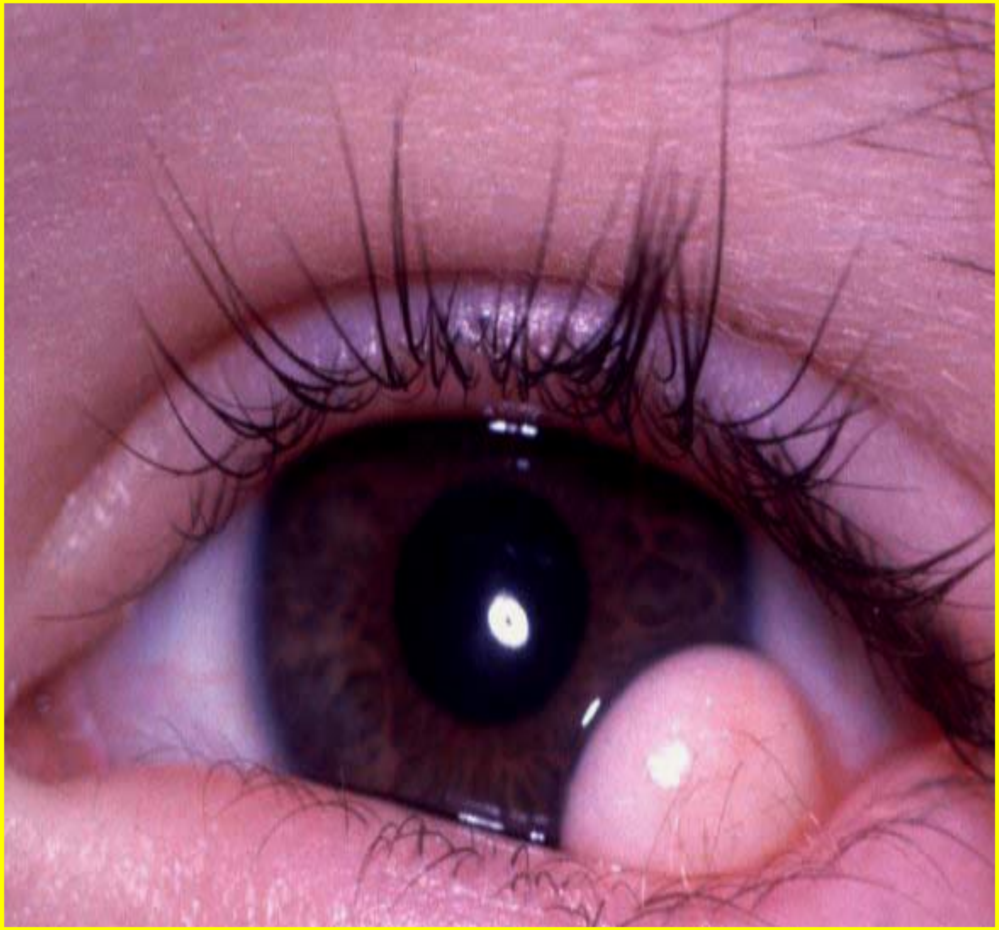
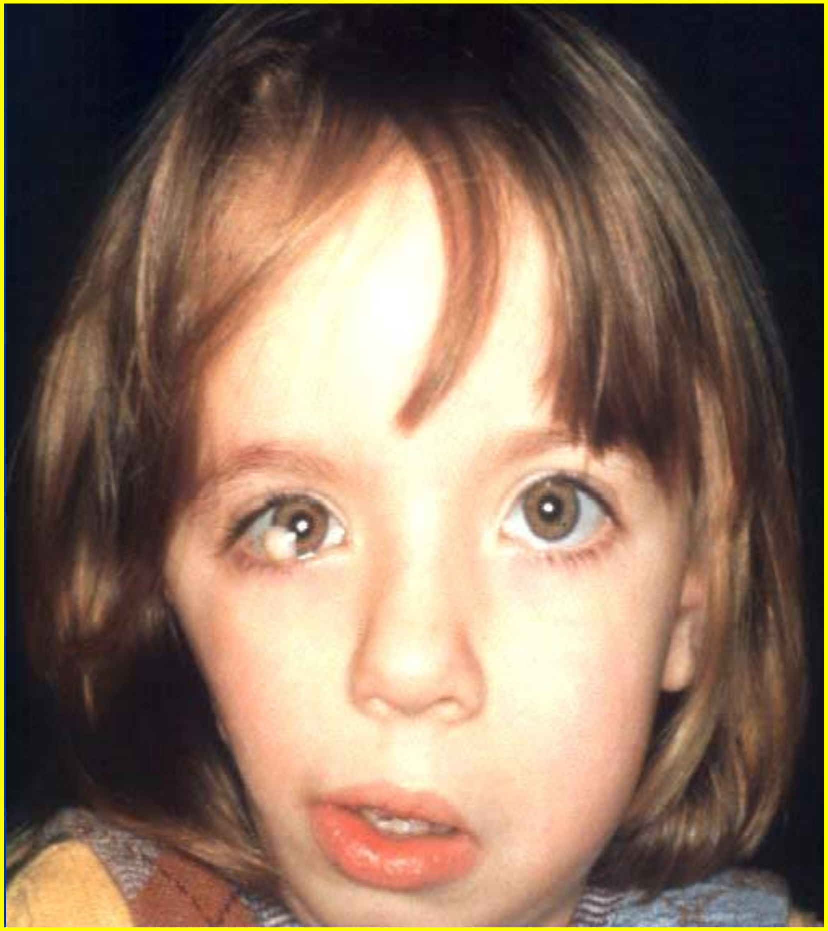
- Presents in first two decades
- Sharply demarcated and slightly elevated

- Most frequently juxtalimbal
- 30% are almost non-pigmented

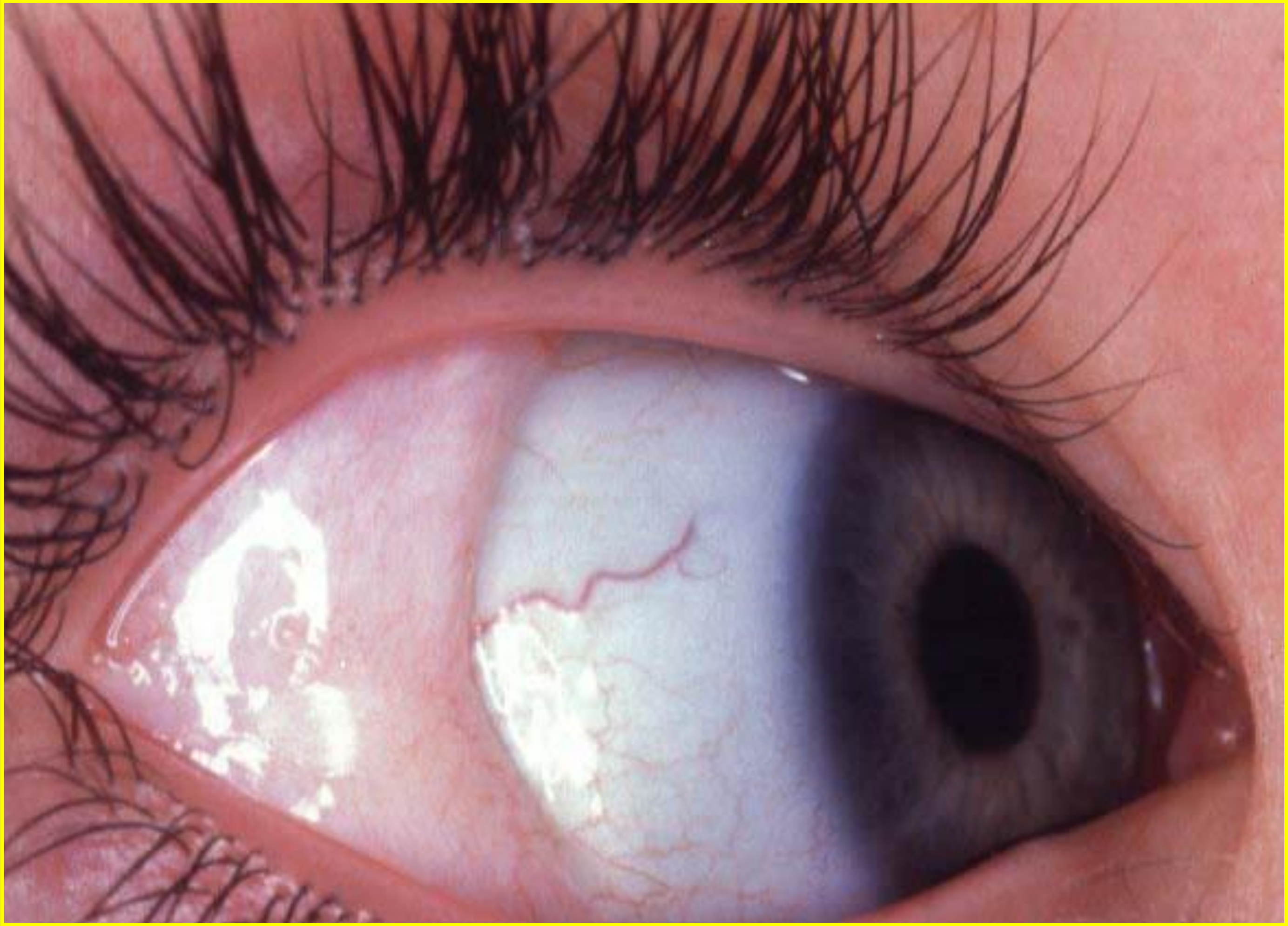
Papilloma

Pedunculated	**Sessile**
	
• Presents in childhood or early adulthood • Infection with papilloma virus • May be multiple and bilateral	• Presents in middle age • Not caused by infection • Single and unilateral

Epibulbar dermoid

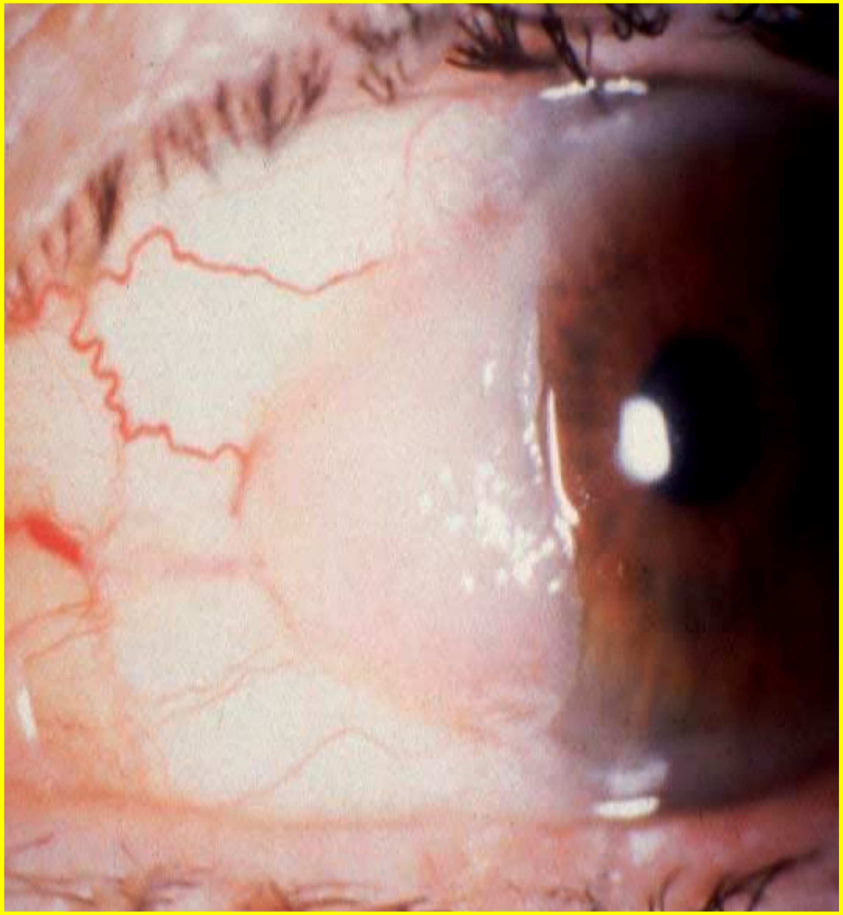
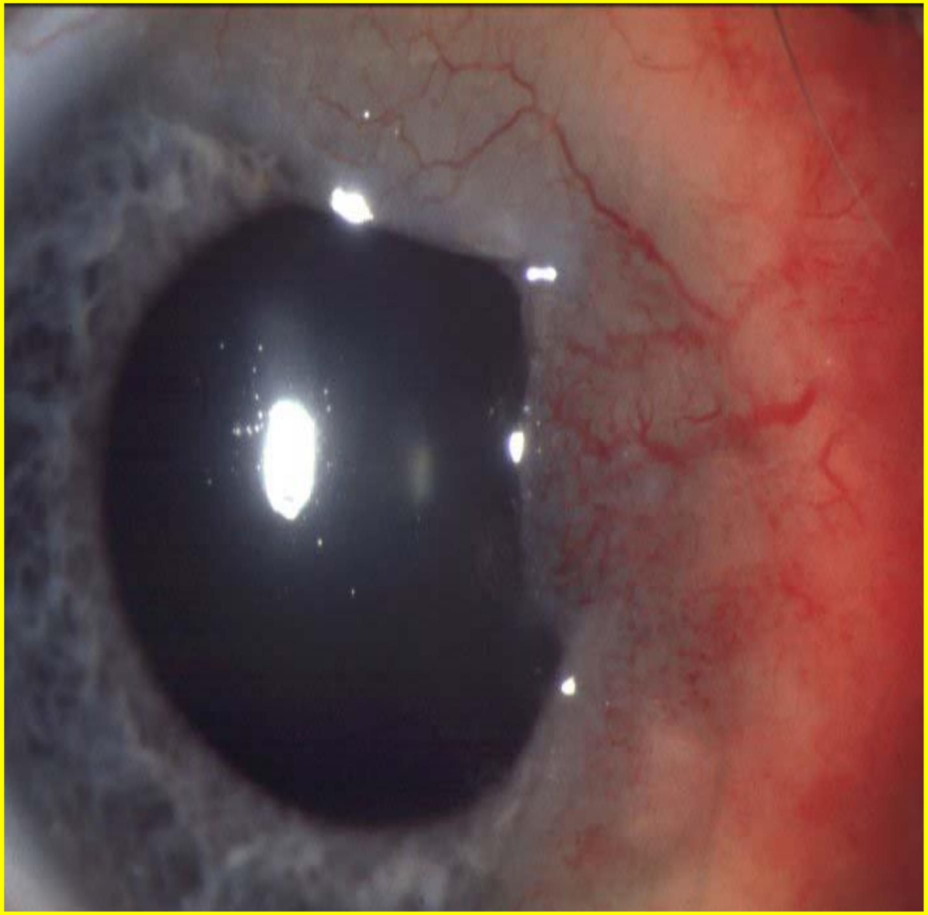
Signs	Association
	
• Presents in childhood • Smooth, soft mass • Usually juxtalimbal	• Occasionally Goldenhar syndrome

Lipodermoid

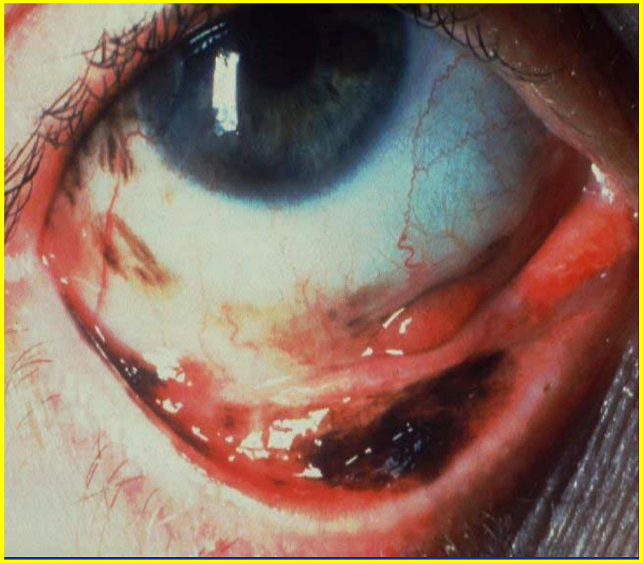
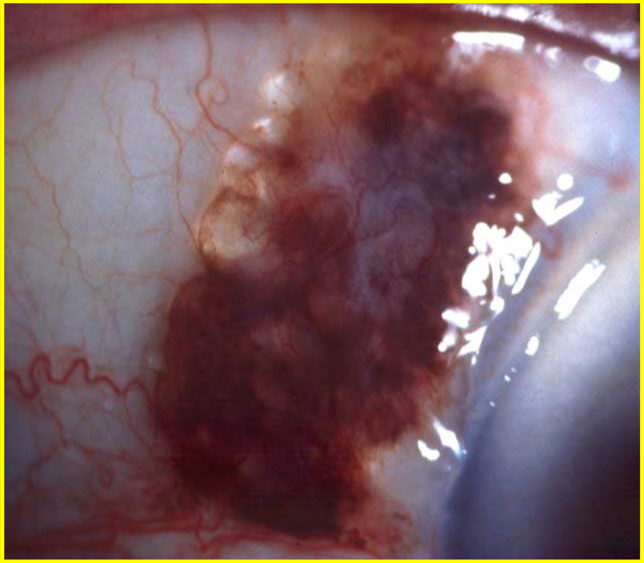
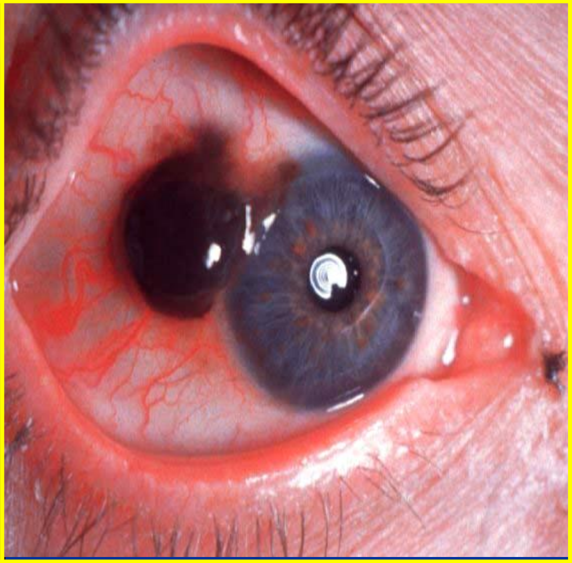


- Presents in adulthood
- Soft, movable, subconjunctival mass
- Most frequently at outer canthus

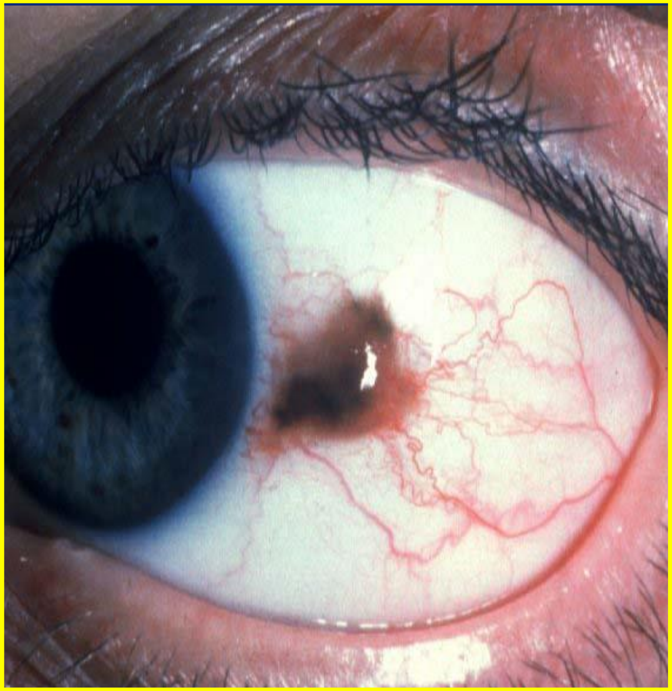
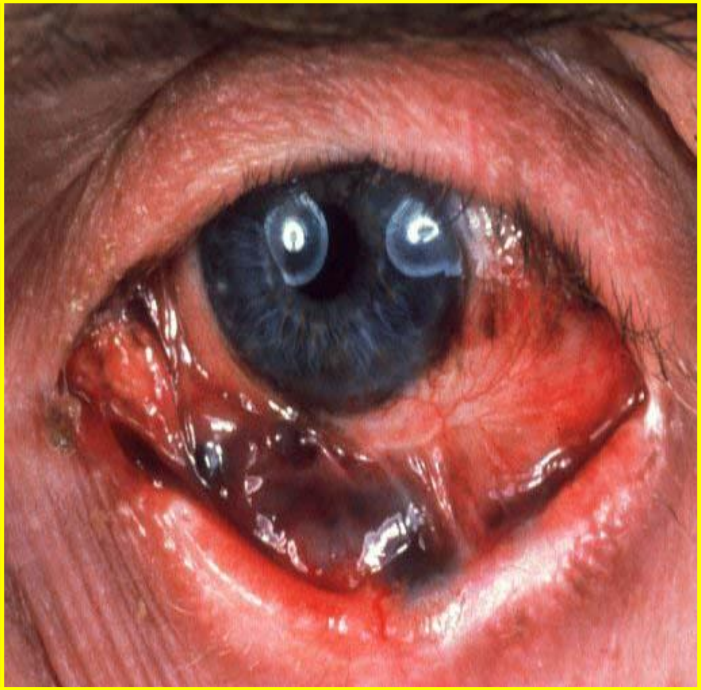
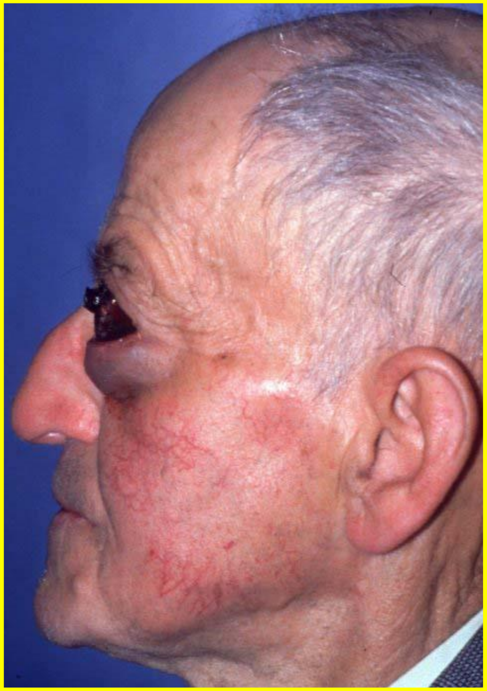
Intraepithelial neoplasia
(carcinoma *in situ*)

Signs	Progression
	
• Presents in late adulthood • Juxtalimbal fleshy avascular mass	• May become vascular and extend onto cornea • Malignant transformation is uncommon

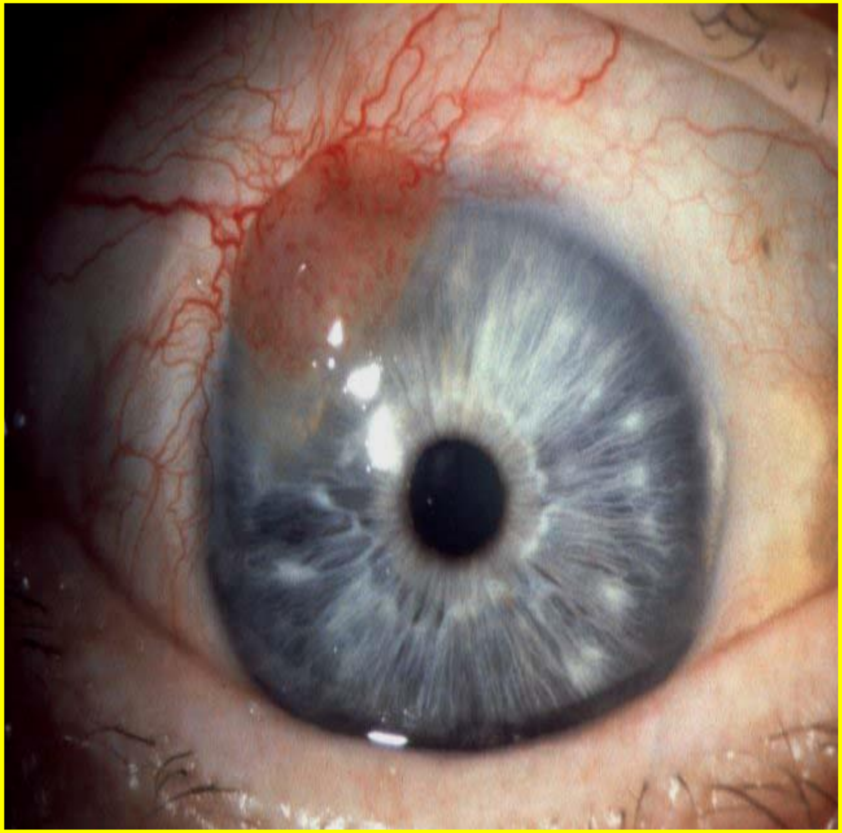
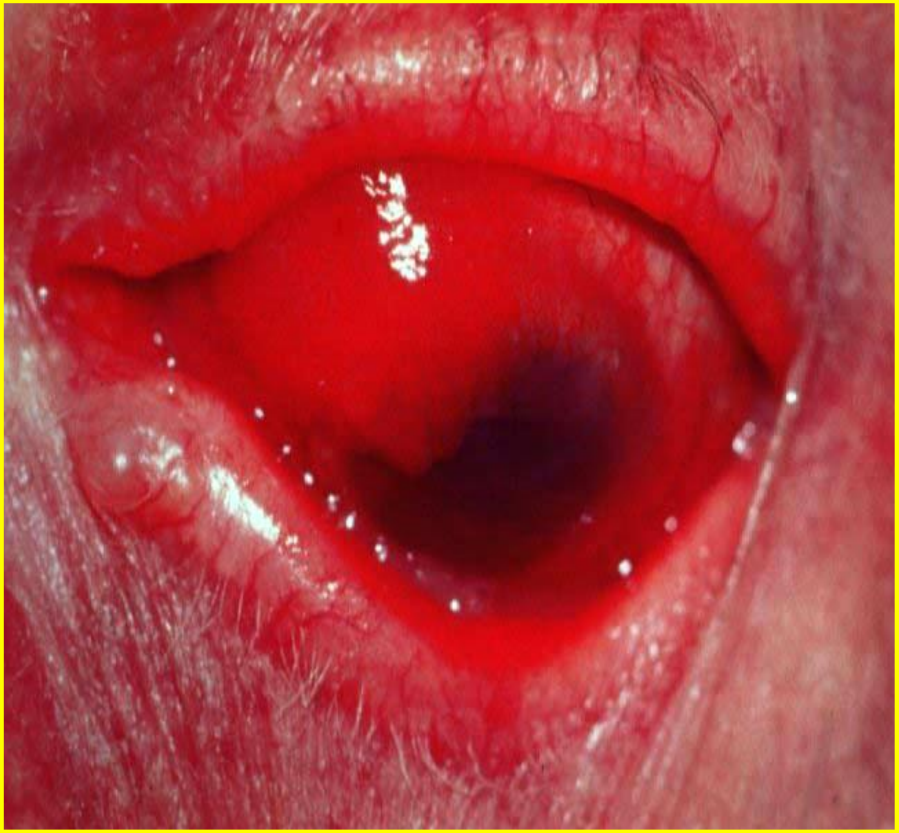
Conjunctival melanoma

From PAM with atypia	From naevus	Primary
		
• Most common type • Sudden appearance of nodules in PAM	• Very rare • Sudden increase in size or pigmentation	• Solitary nodule • Frequently juxtalimbal but may be anywhere

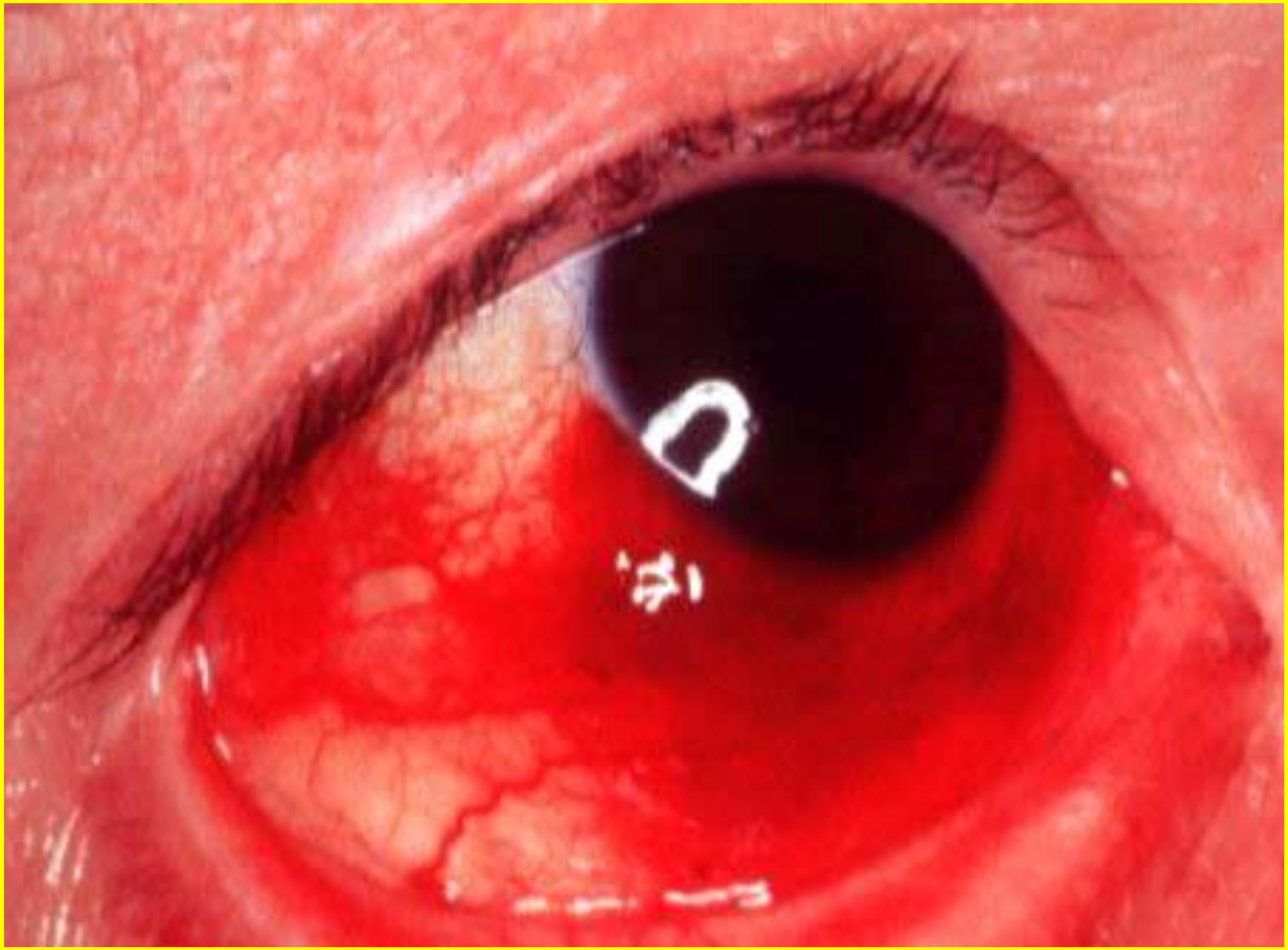
Treatment of conjunctival melanoma

Localized tumour	Diffuse tumour	Orbital recurrence
		
• Excision • Adjunctive cryotherapy	• Excision of nodules • Adjunctive cryotherapy or mitomycin C	• Excision and radiotherapy • Exenteration

Squamous cell carcinoma

Signs	Progression
	
• Arises from intraepithelial neoplasia or *de novo* • Presents in late adulthood • Frequently juxtalimbal	• Slow-growing • May spread extensively • Rarely metastasizes

Kaposi sarcoma



- Affects patients with AIDS
- Vascular, slow-growing tumour of low malignancy
- Very sensitive to radiotherapy
- Most frequently in inferior fornix

CORNEA

Transparency of the Cornea

1. Absence of blood vessels
2. Regular arrangement of lamellae
3. Corneal dehydration by Endothelium pump system
4. Demyelination of Nerve Fibers
5. Non-Keratinized epithelium

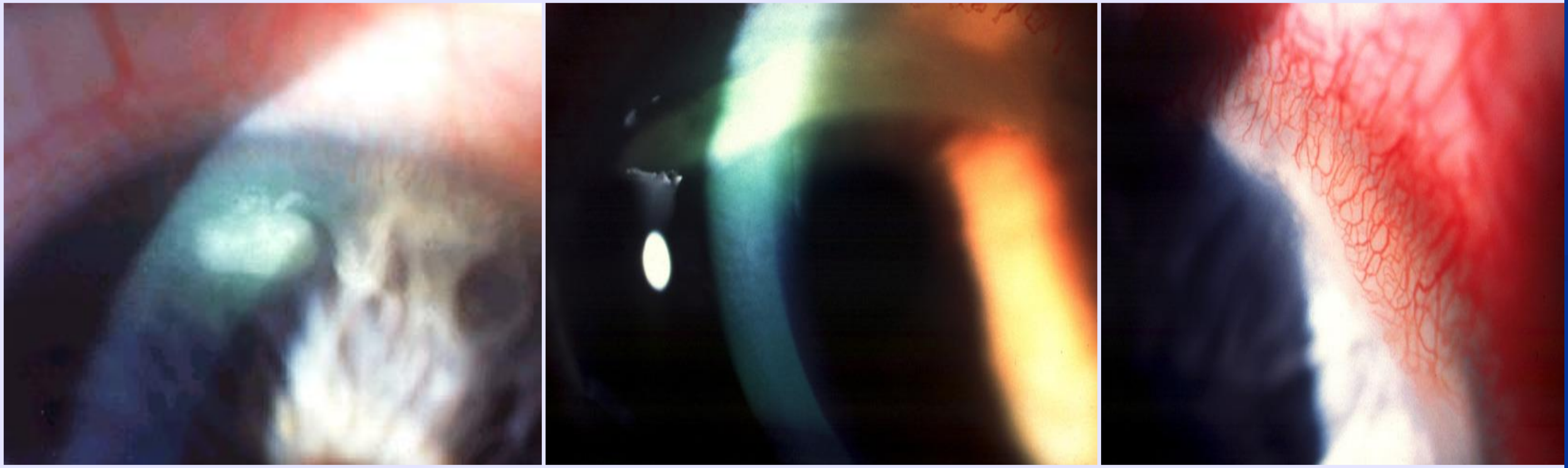
PERIPHERAL CORNEAL INFLAMMATION

Marginal keratitis

Marginal keratitis

- Hypersensitivity reaction to *Staph*. exotoxins
- May be associated with *Staph*. blepharitis
- Unilateral, transient but recurrent

Progression



Subepithelial infiltrate separated by clear zone	Circumferential spread	Bridging vascularization followed by resolution

Treatment - short course of topical steroids

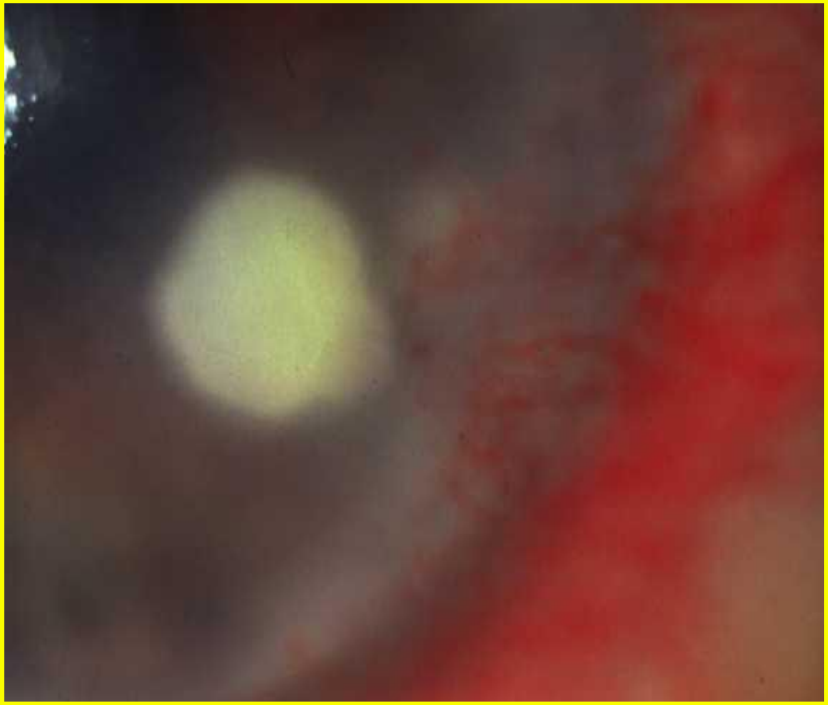
CORNEAL INFECTIONS

1. Bacterial keratitis
2. Fungal keratitis
3. Herpes simplex keratitis
    - -Epithelial
    - -Disciform
4. Herpes zoster keratitis

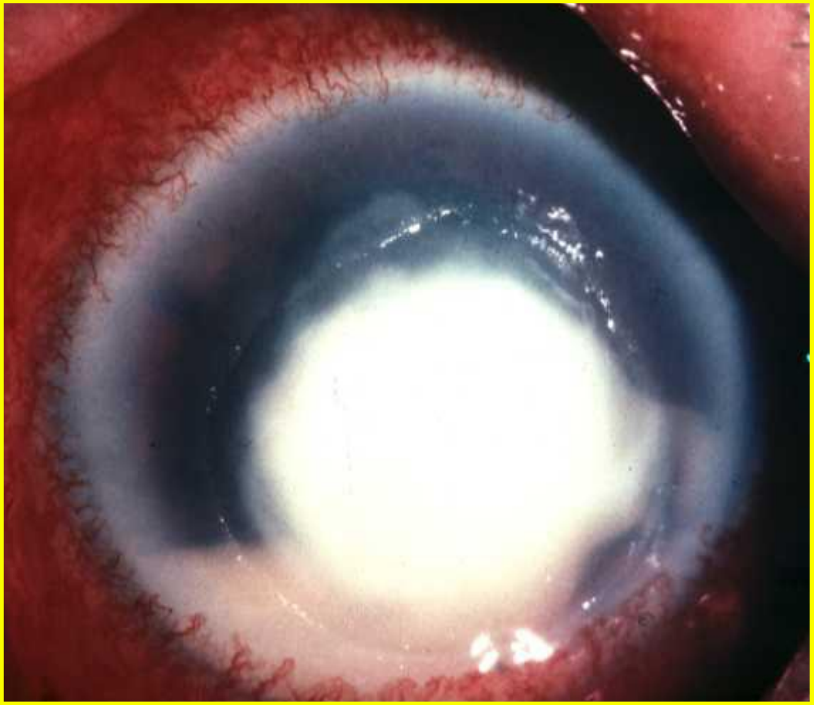
Bacterial keratitis

Predisposing factors

- Contact lens wear
- Chronic ocular surface disease
- Corneal hypoaesthesia



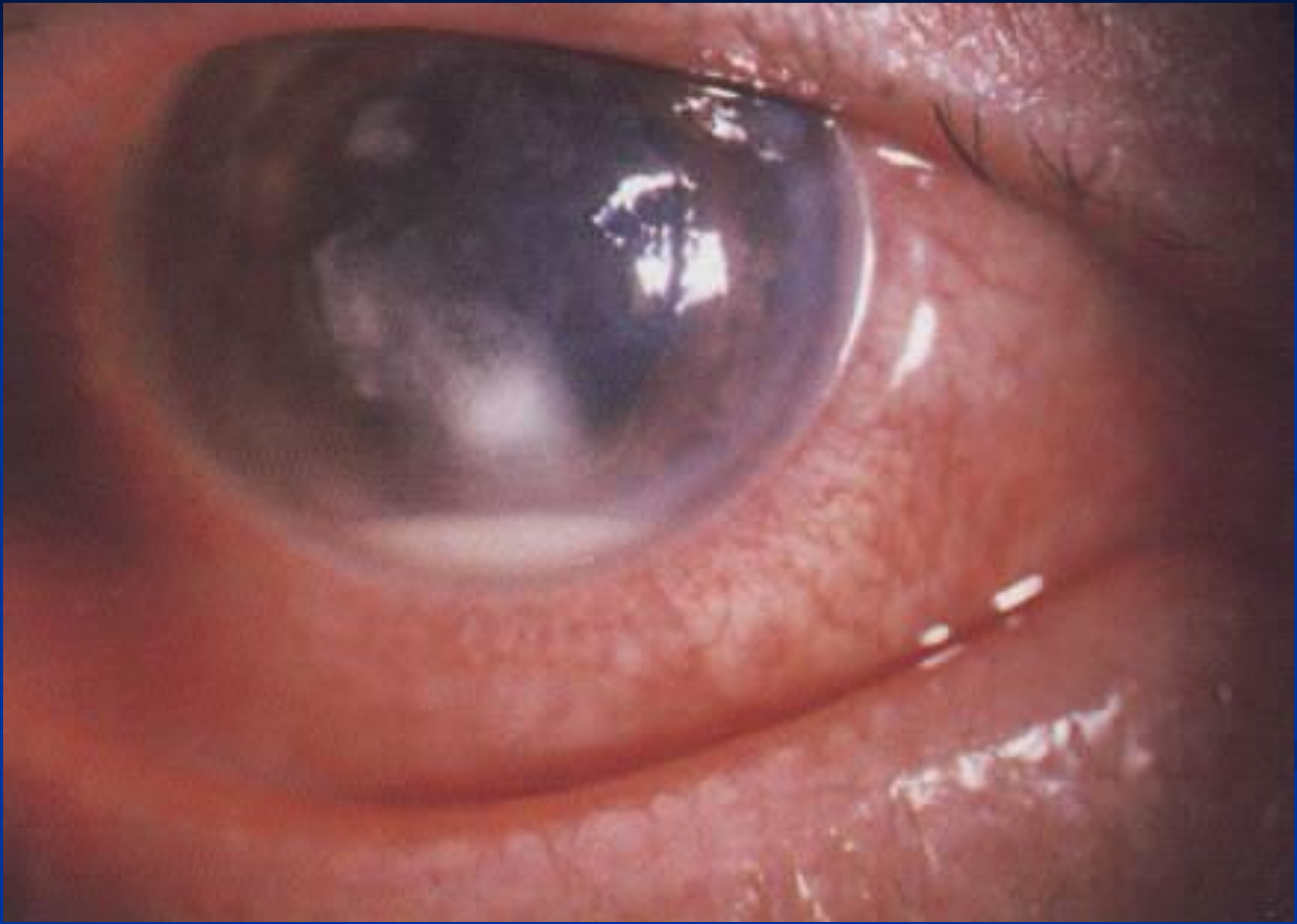
Expanding oval, yellow-white, dense stromal infiltrate



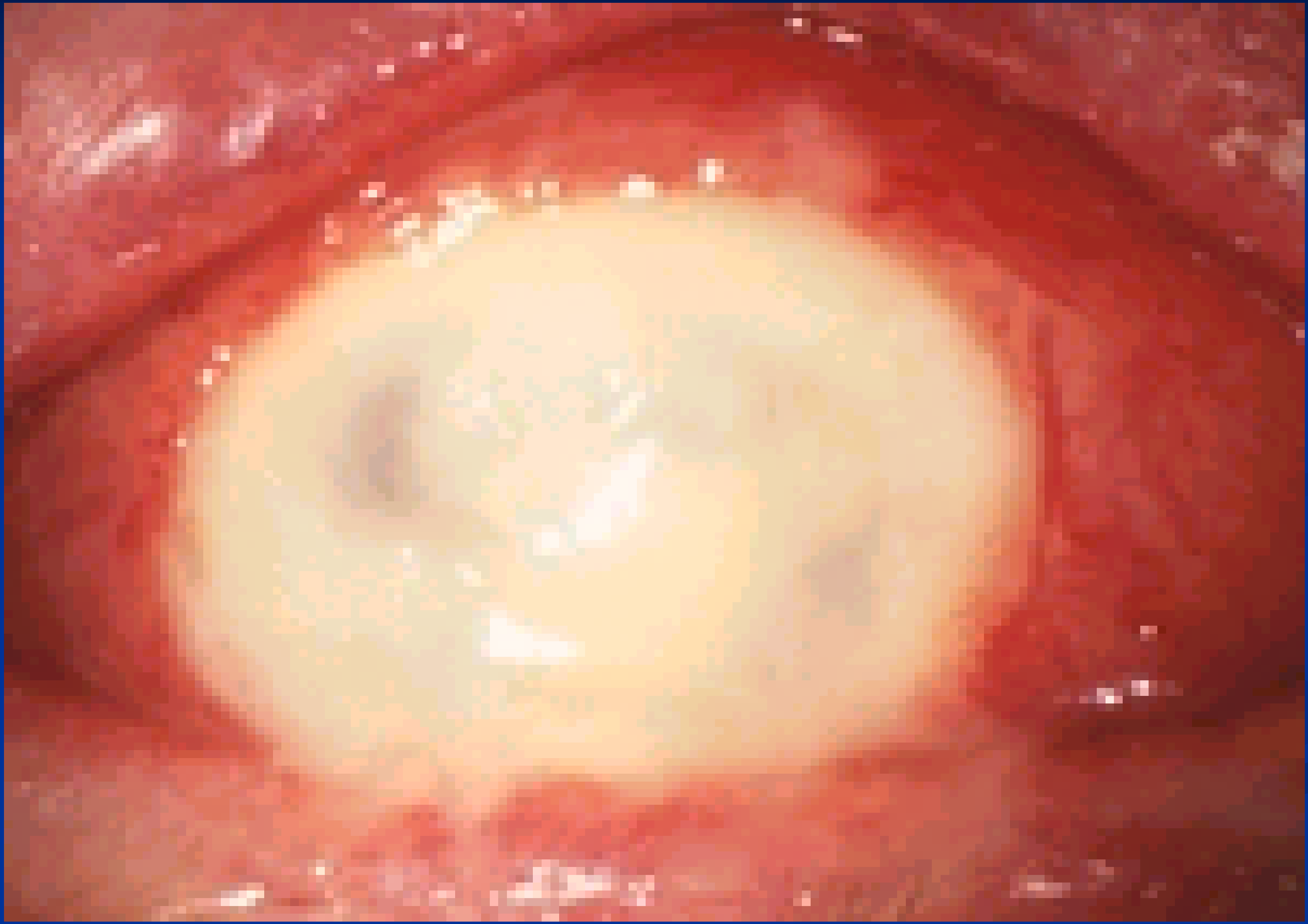
Stromal suppuration and hypopyon

Treatment - topical ciprofloxacin 0.3% or ofloxacin 0.3%

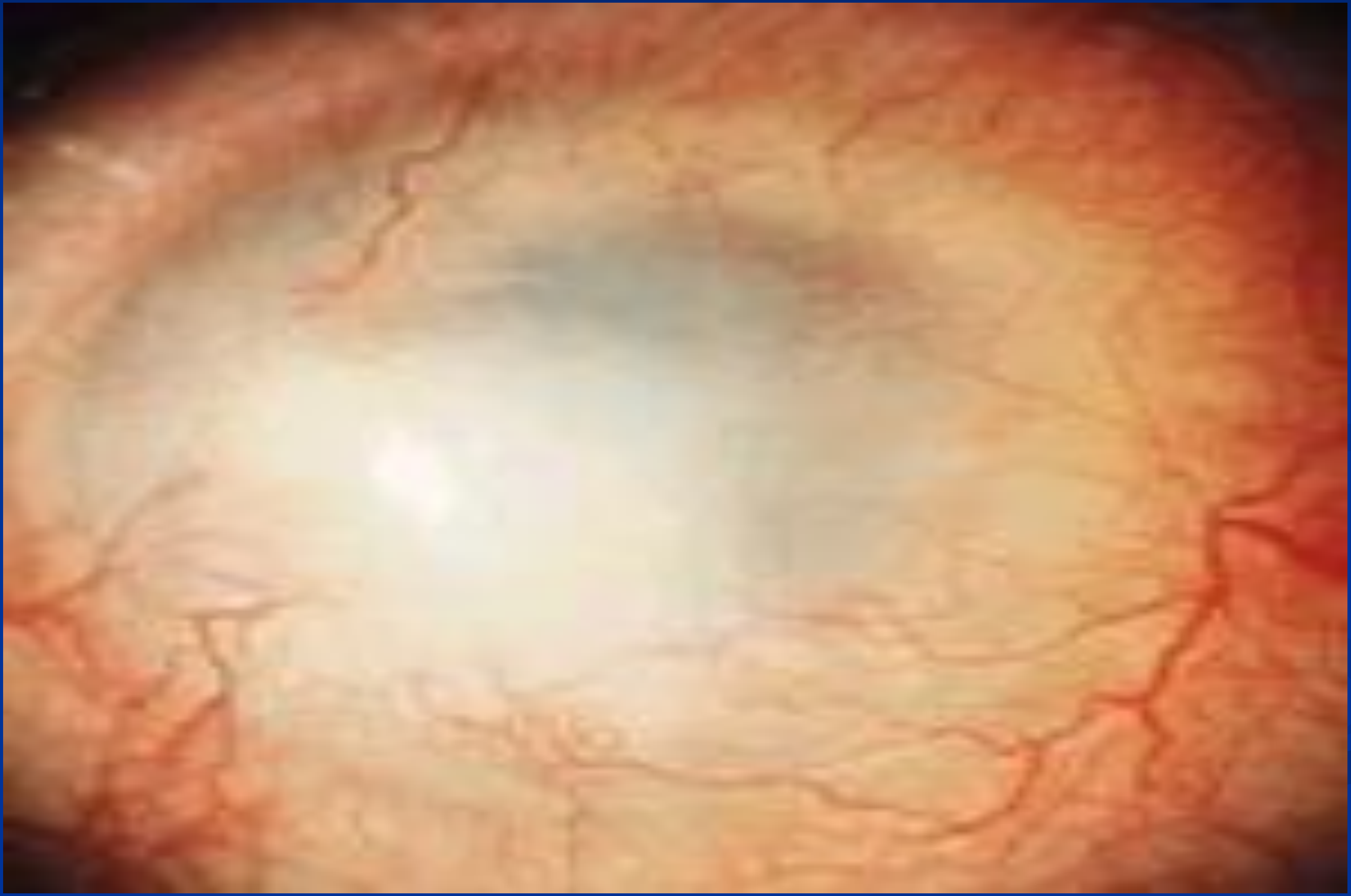
Corneal Ulcer with hypopyon



Severe bacterial keratitis with infectious scleritis

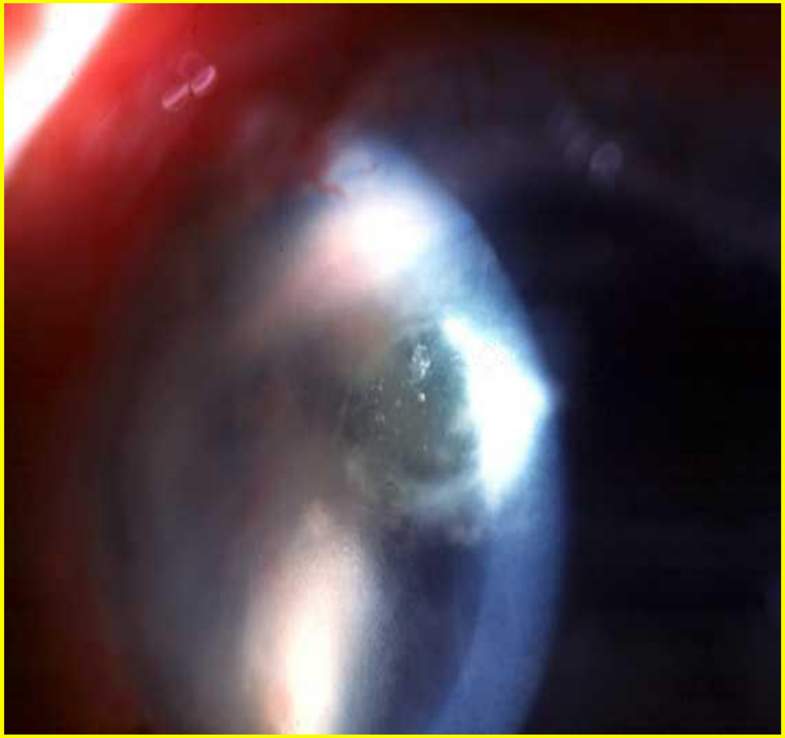


Abnormal Scars

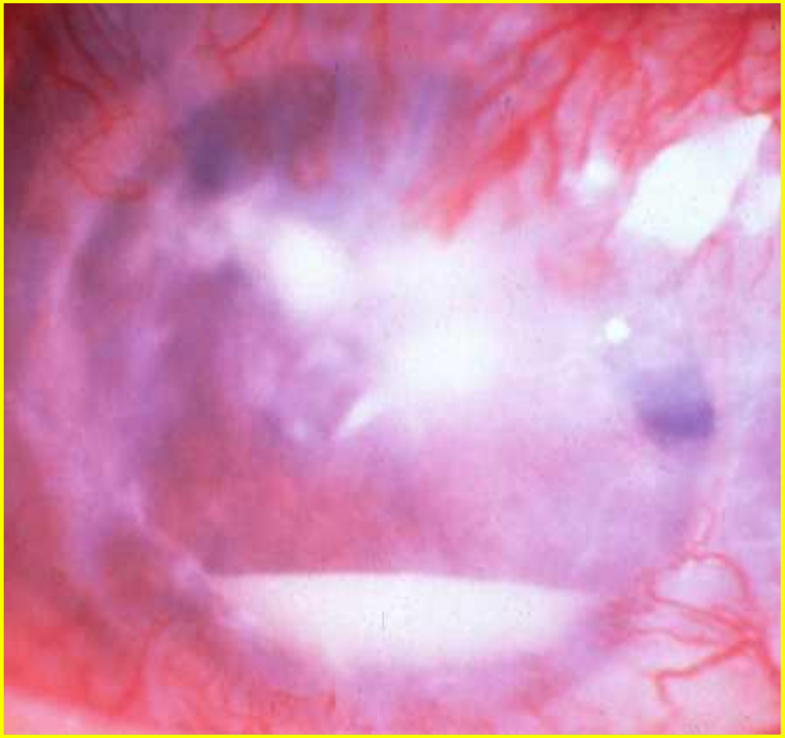


Fungal keratitis

Frequently preceded by ocular trauma with organic matter



Greyish-white ulcer which may be surrounded by feathery infiltrates

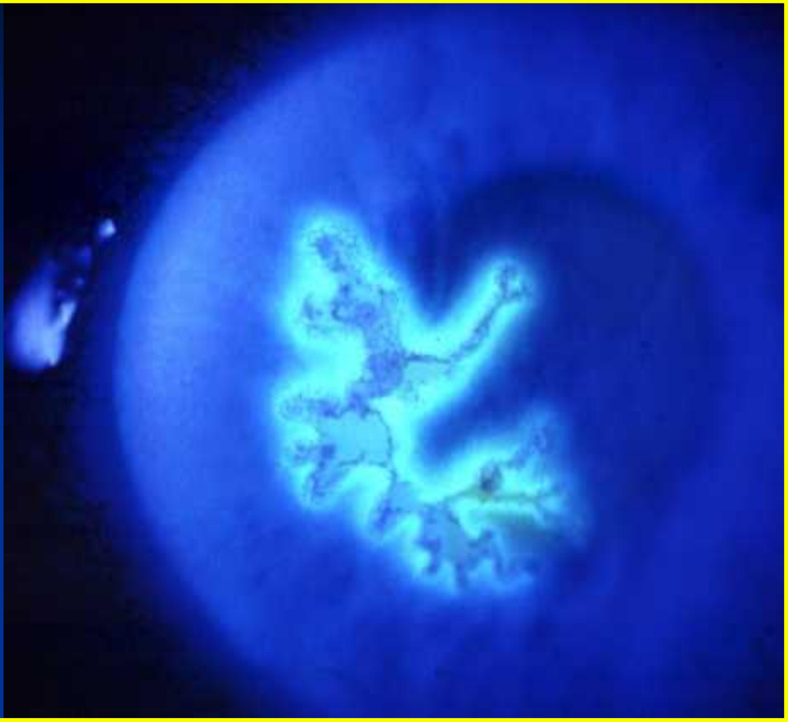


Slow progression and occasionally hypopyon

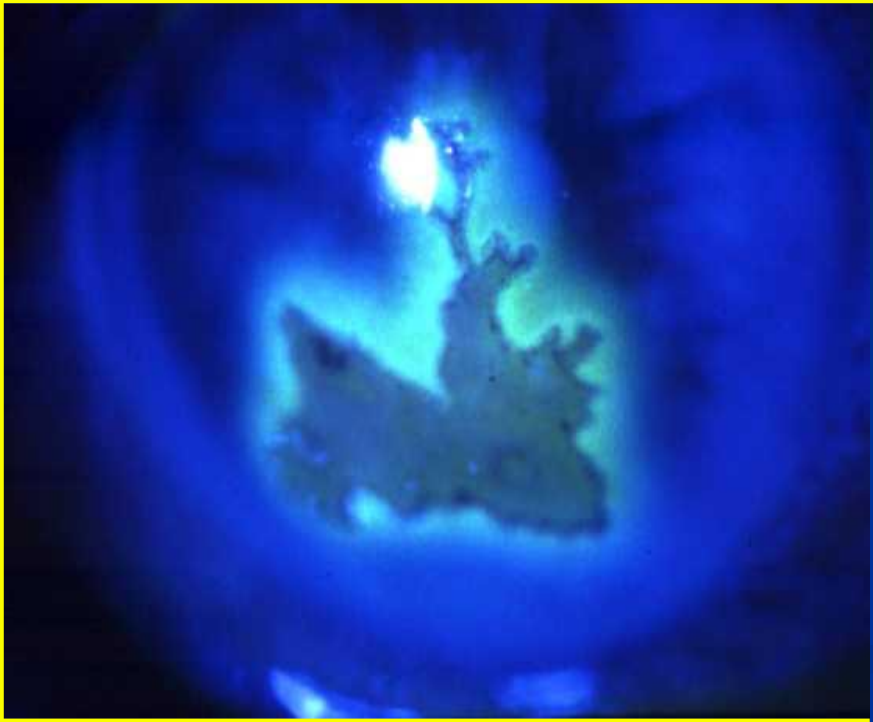
Treatment

- Topical antifungal agents
- Systemic therapy if severe
- Penetrating keratoplasty if unresponsive

Herpes simplex epithelial keratitis



- Dendritic ulcer with terminal bulbs
  - Stains with fluorescein

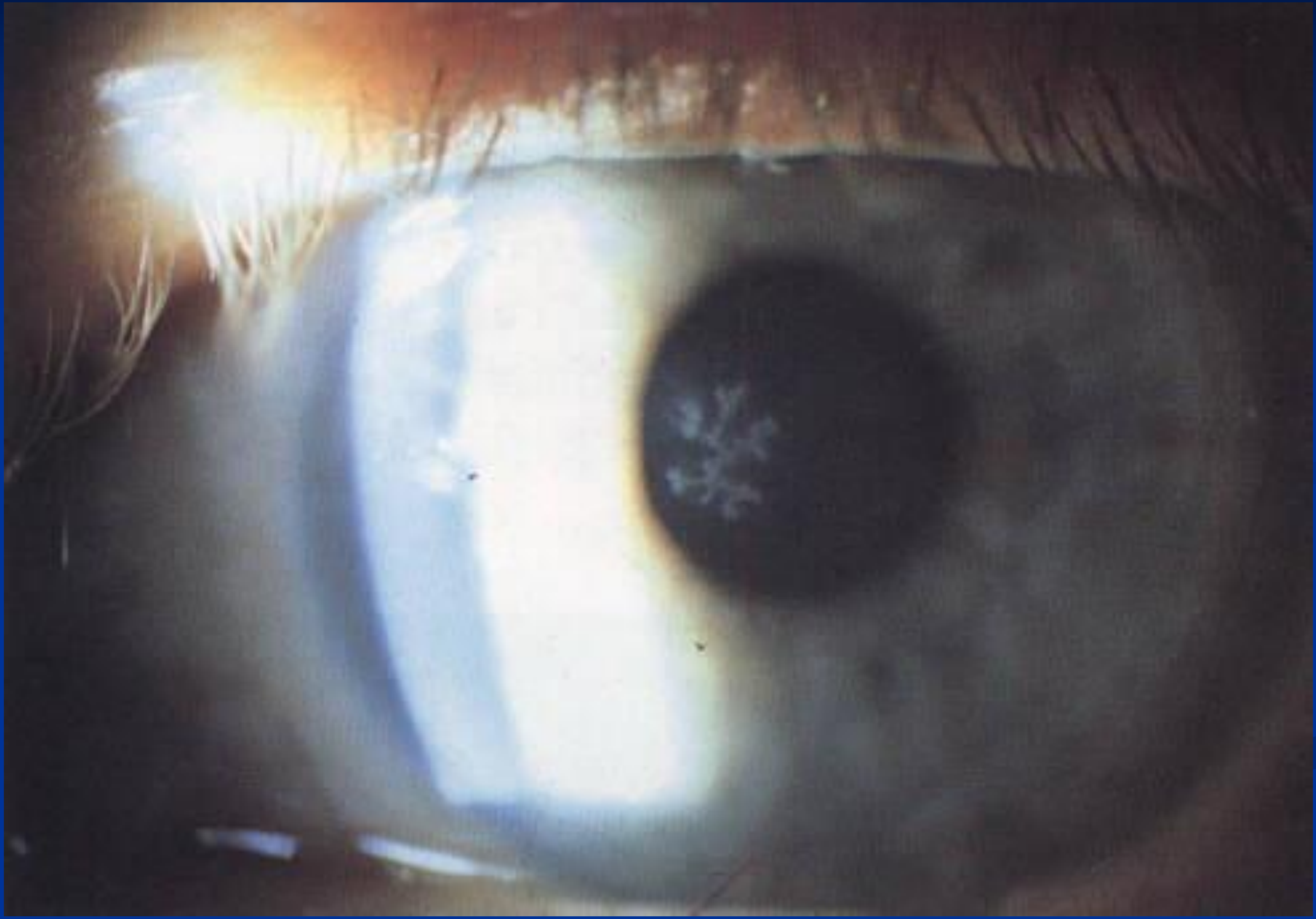


- May enlarge to become geographic

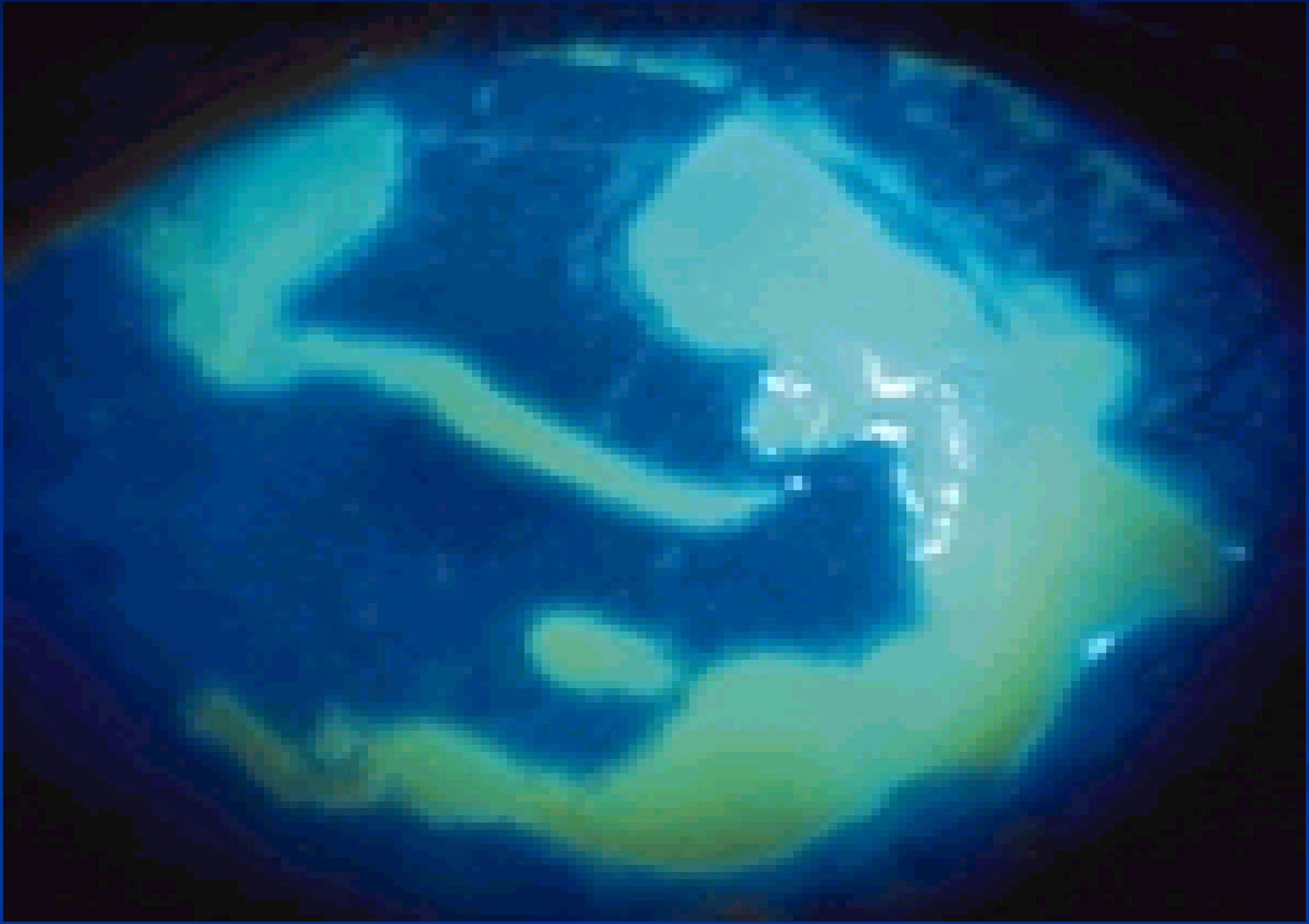
Treatment

- Aciclovir 3% ointment x 5 daily
- Trifluorothymidine 1% drops 2-hourly
- Debridement if non-compliant

Herpetic Dendritic Ulcer



Herpetic geographical ulcer

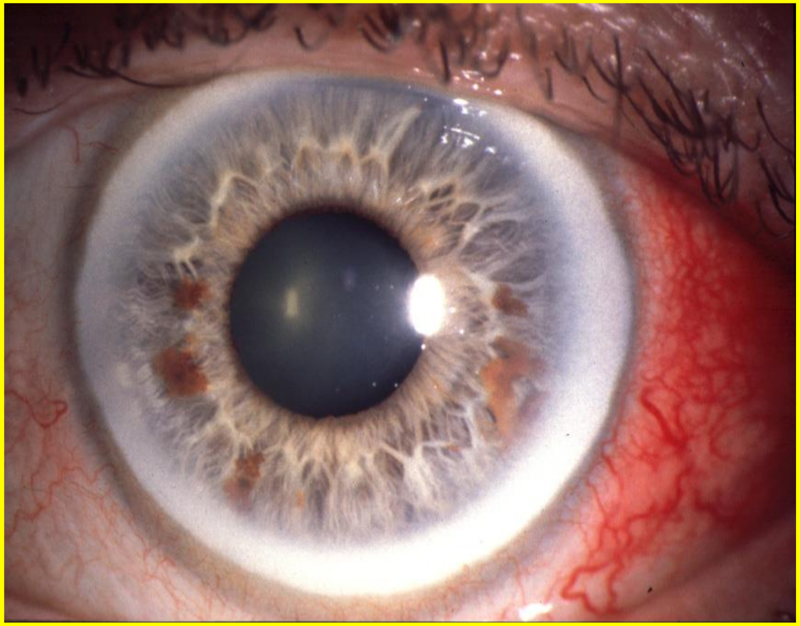


CORNEAL DEGENERATIONS

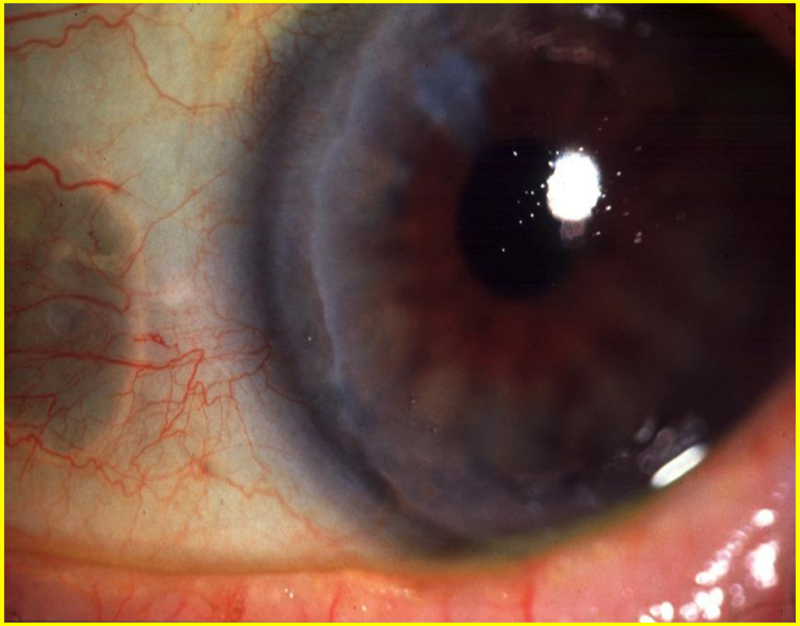
1. **Age-related**
   - Arcus senilis
2. **Lipid keratopathy**
   - Primary
   - Secondary
3. **Band keratopathy**

Arcus senilis

- Innocuous and extremely common in elderly
- Occasionally associated with hyperlipoproteinaemia



- Bilateral, circumferential bands of lipid deposits
- Diffuse central and sharp peripheral border

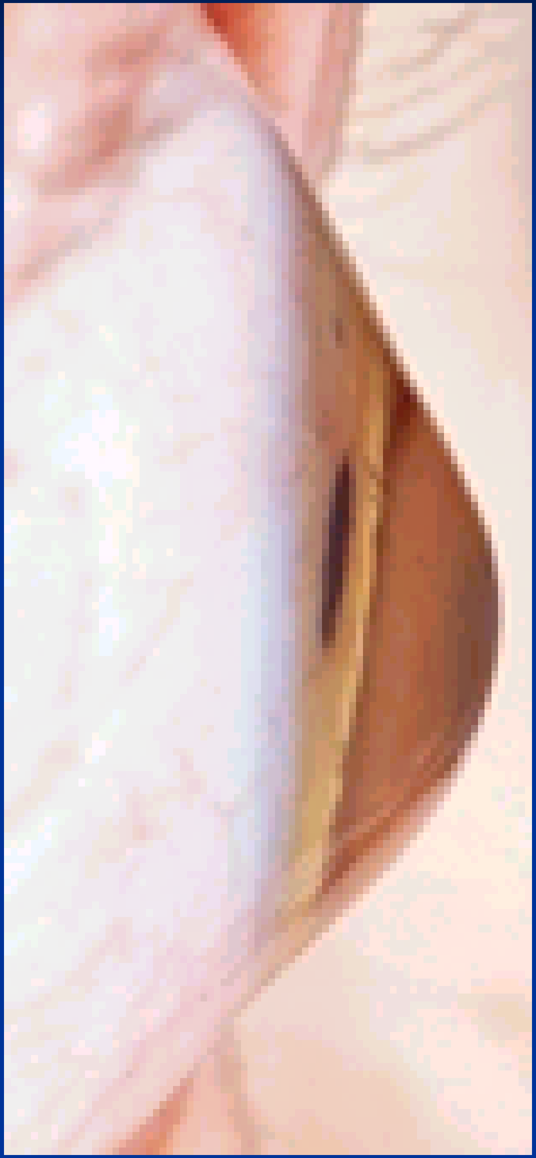


- Peripheral border separated from limbus by clear zone
- Clear zone may be thinned (senile furrow)

CORNEAL ECTASIAS

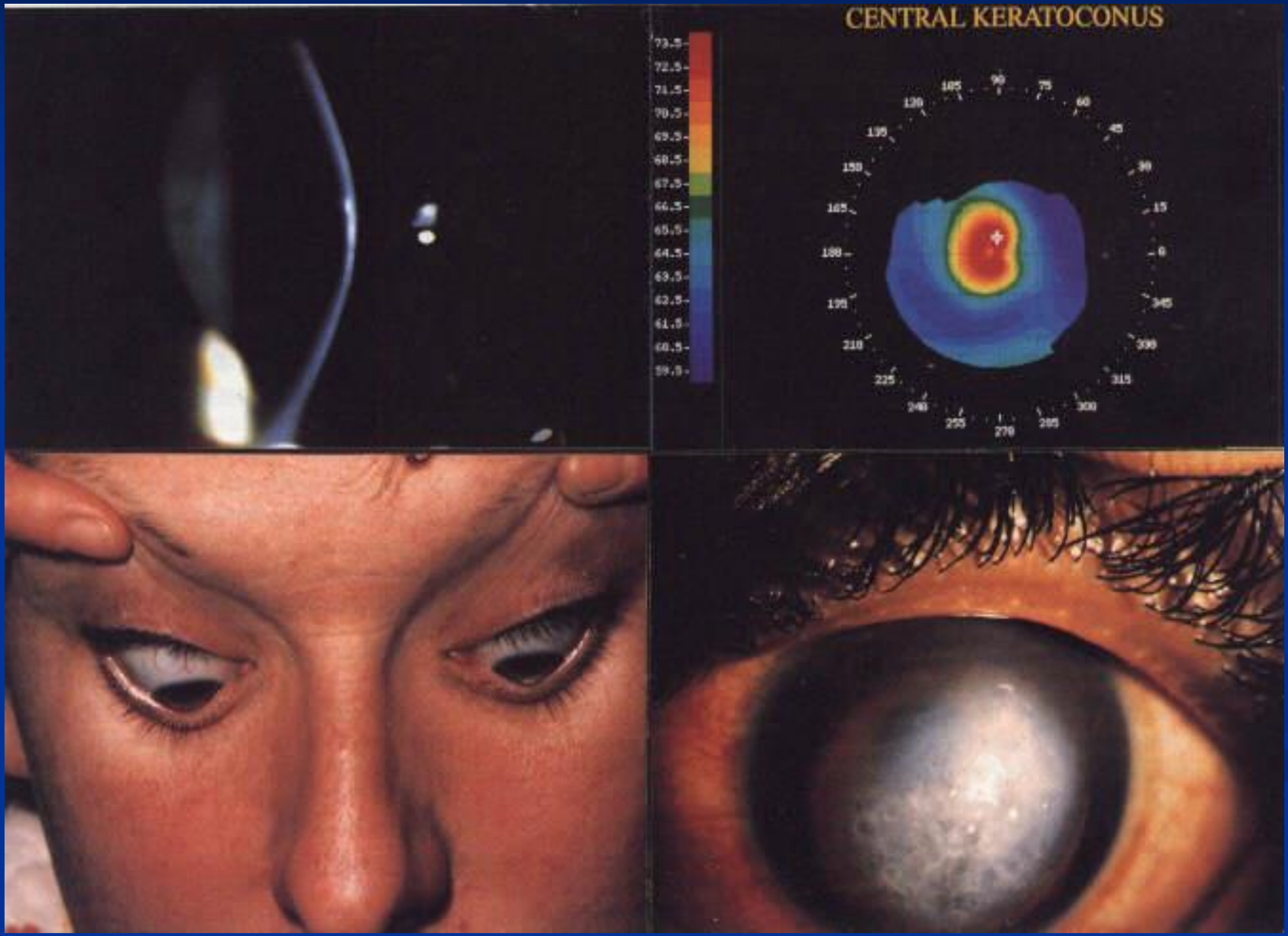
Keratoconus

Keratoconus

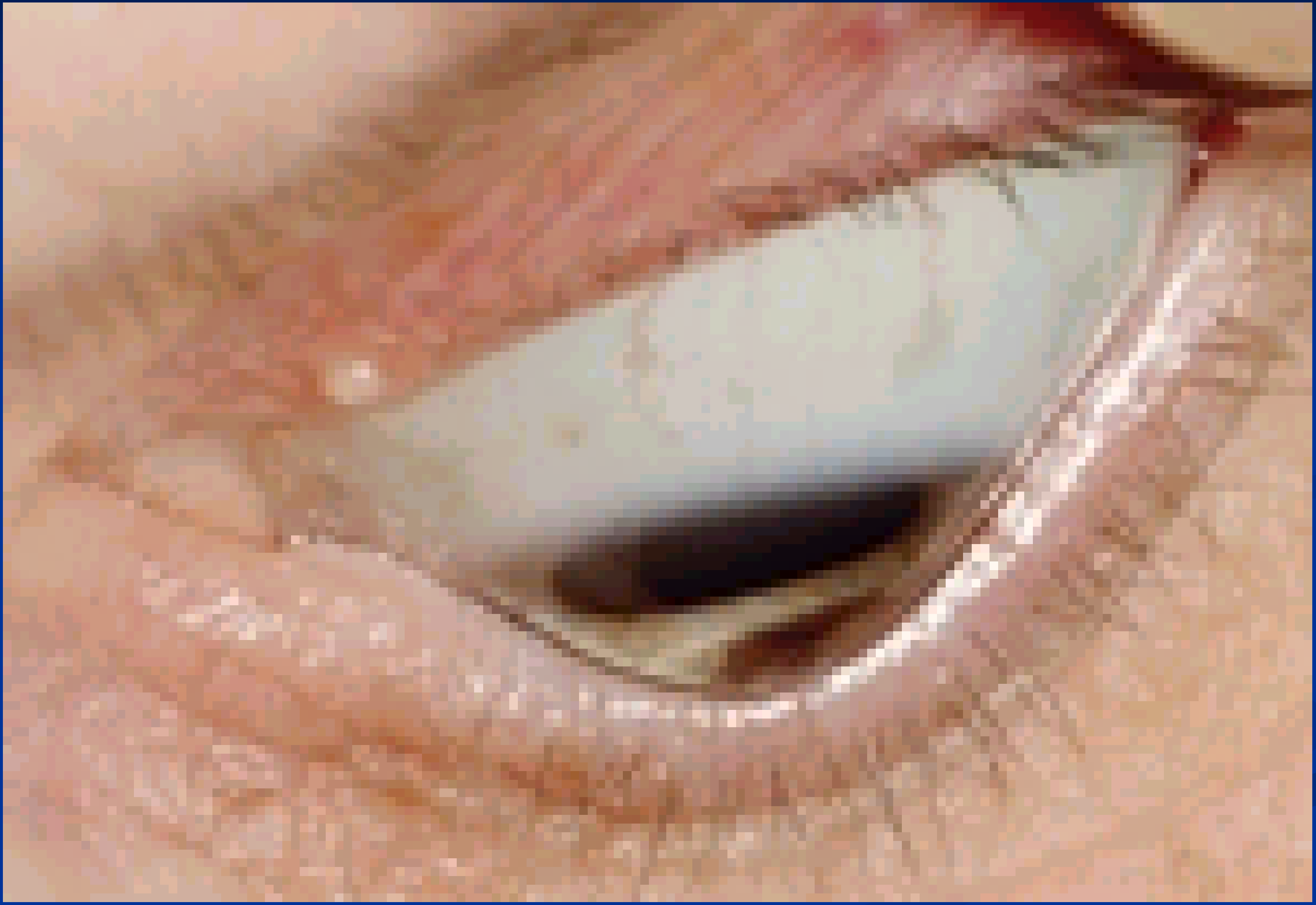


Weakness of the cornea

Keratoconus:
Vogt’s line; corneal mapping; Manson’s sign; Hydrops

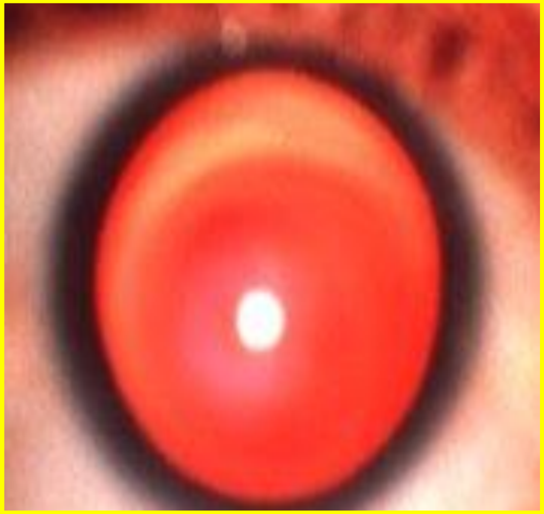

CENTRAL KERATOCONUS
73.5
72.5
71.5
70.5
69.5
68.5
67.5
66.5
65.5
64.5
63.5
62.5
61.5
60.5
59.5
105
90
75
120
60
135
45
150
30
165
15
180
0
195
345
210
330
225
315
240
300
255
270
285

Manson's sign

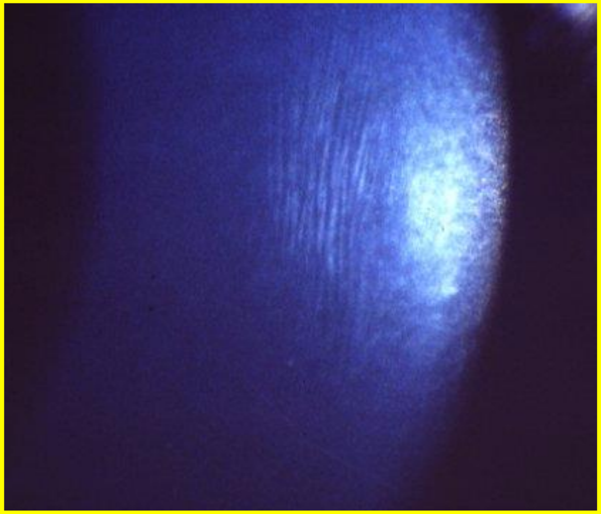


Signs of keratoconus

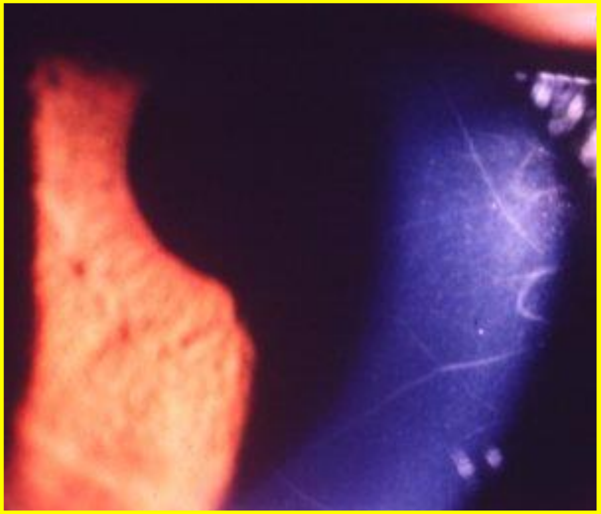
Bilateral in 85% but asymmetrical



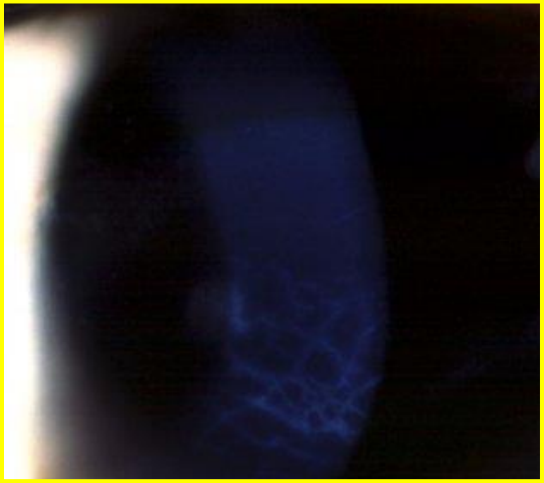
Oil droplet reflex



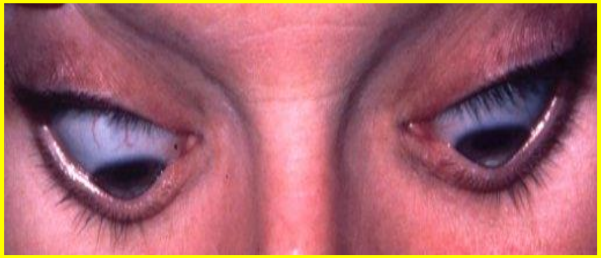
Vogt striae



Prominent corneal nerves

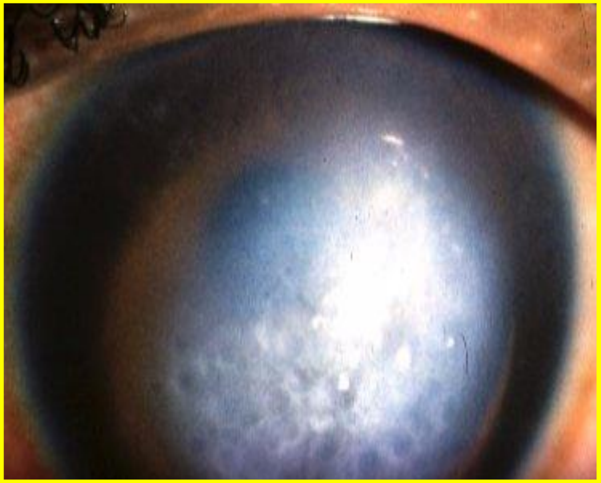


Fleischer ring & scarring



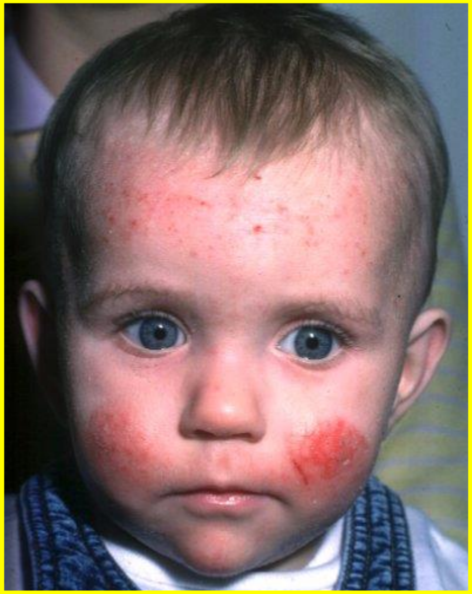
Bulging of lower lids on downgaze

Munson sign

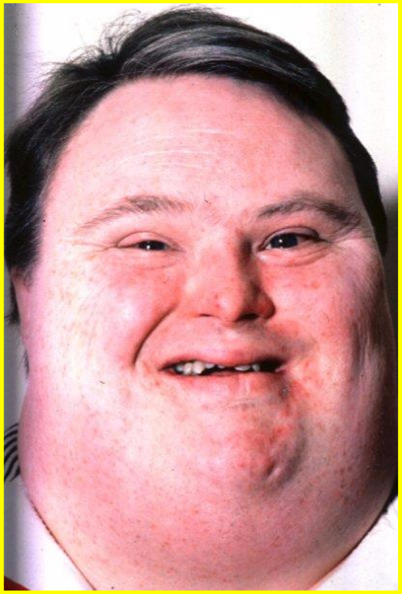


Acute hydrops

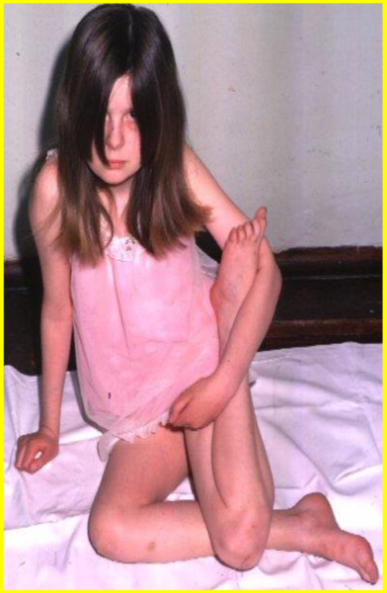
Systemic associations of keratoconus



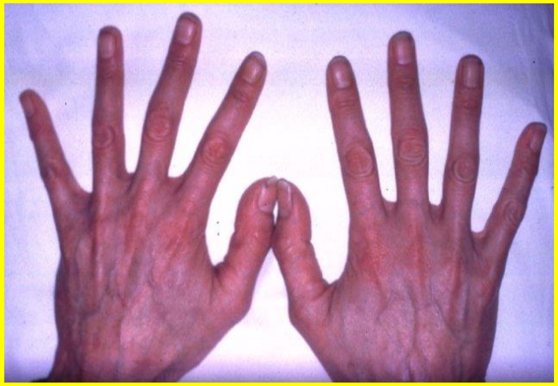
Atopic dermatitis



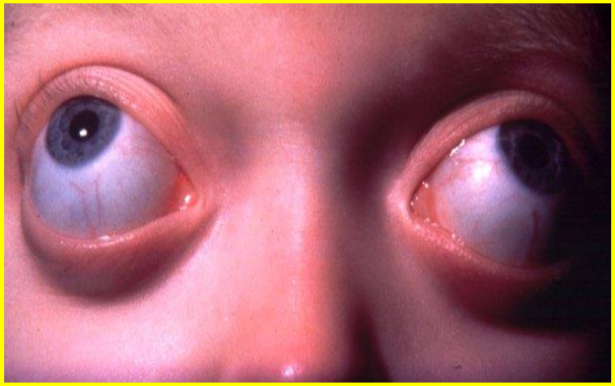
Down syndrome



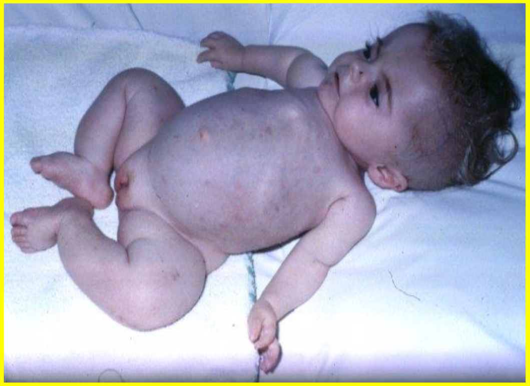
Ehlers-Danlos syndrome



Marfan syndrome



Crouzon syndrome



Osteogenesis imperfecta

Keratoconus

Treatment

- Glasses
- Contact Lenses
- Crosslinking using Riboflavin and UVA
- Corneal rings
- Corneal Graft

CORNEAL SURGERY

1. Penetrating keratoplasty

2. Refractive surgery

- Radial keratotomy
- Photorefractive keratectomy (PRK)
- Laser in-situ keratomileusis (LASIK)

Penetrating Keratoplasty

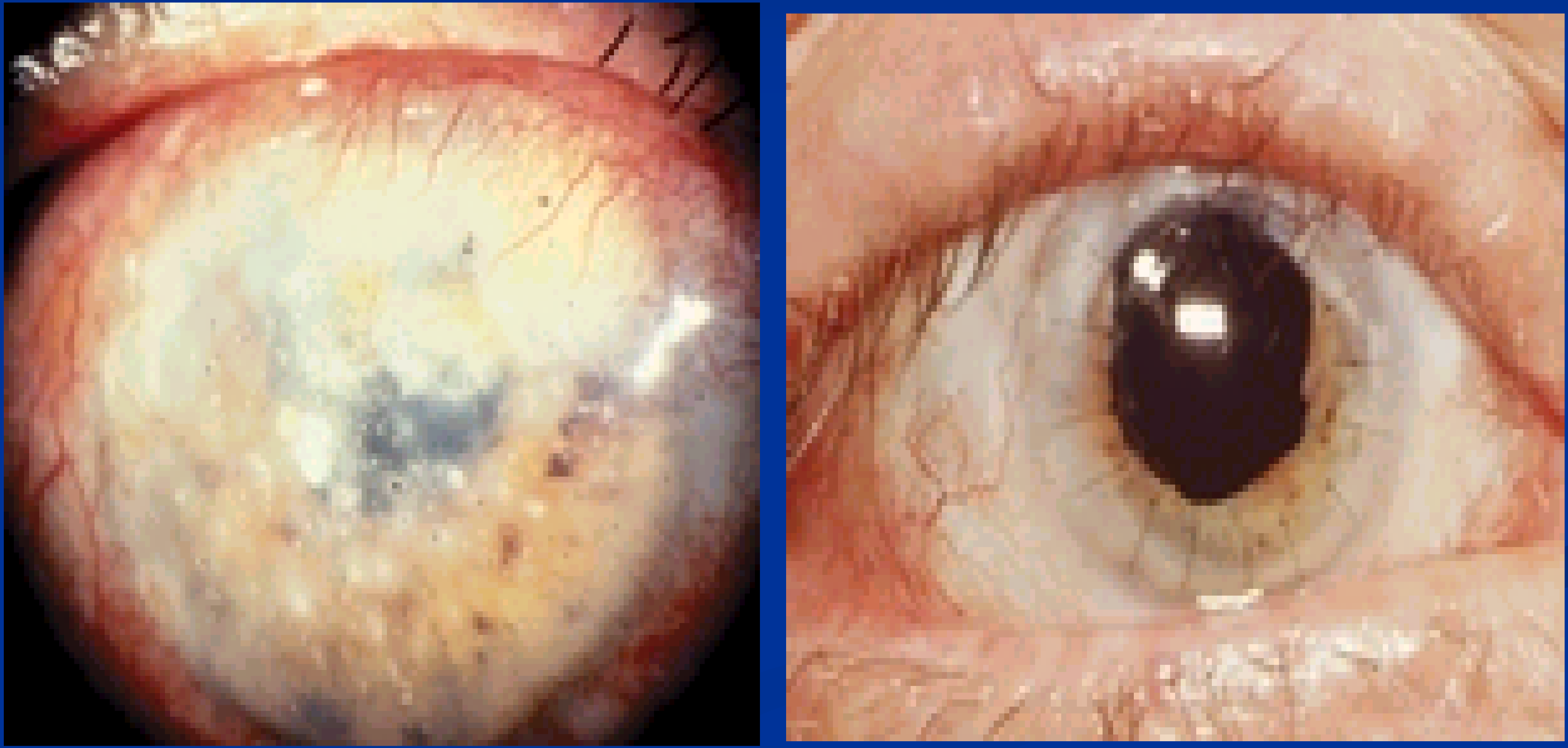
1. Indications

- Optical (e.g. bullous keratopathy, dystrophies)
- Tectonic (e.g. severe stromal thinning, descemetocele)
- Therapeutic (e.g. severe keratitis)
- Cosmetic

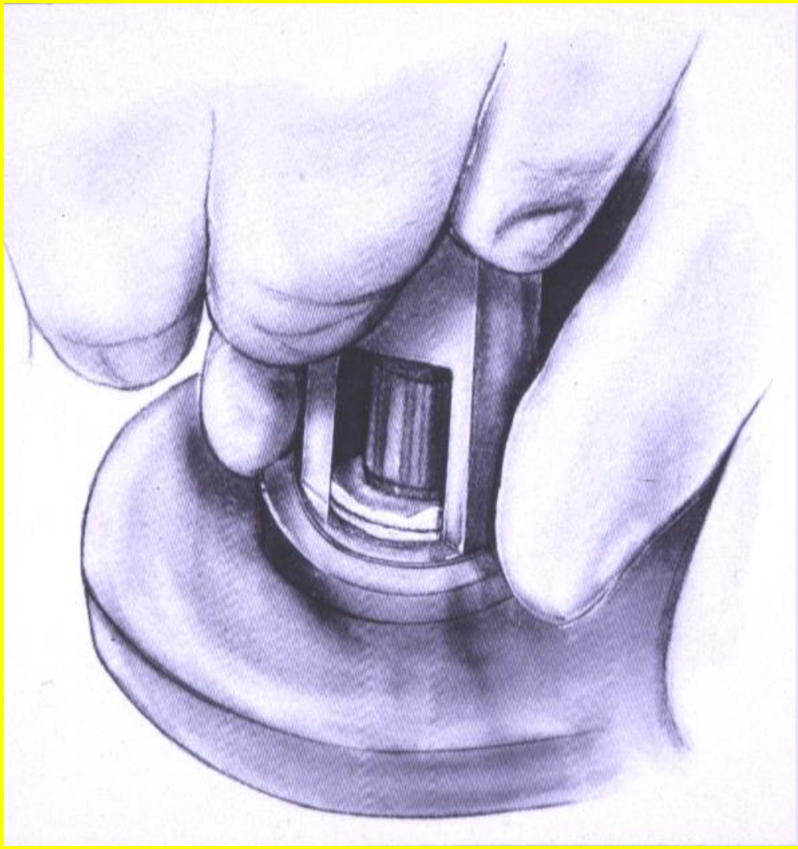
2. Adverse prognostic factors

- Severe stromal vascularization
- Absence of corneal sensation
- Progressive conjunctival inflammation (e.g. pemphigoid)
- Tear film dysfunction
- Glaucoma

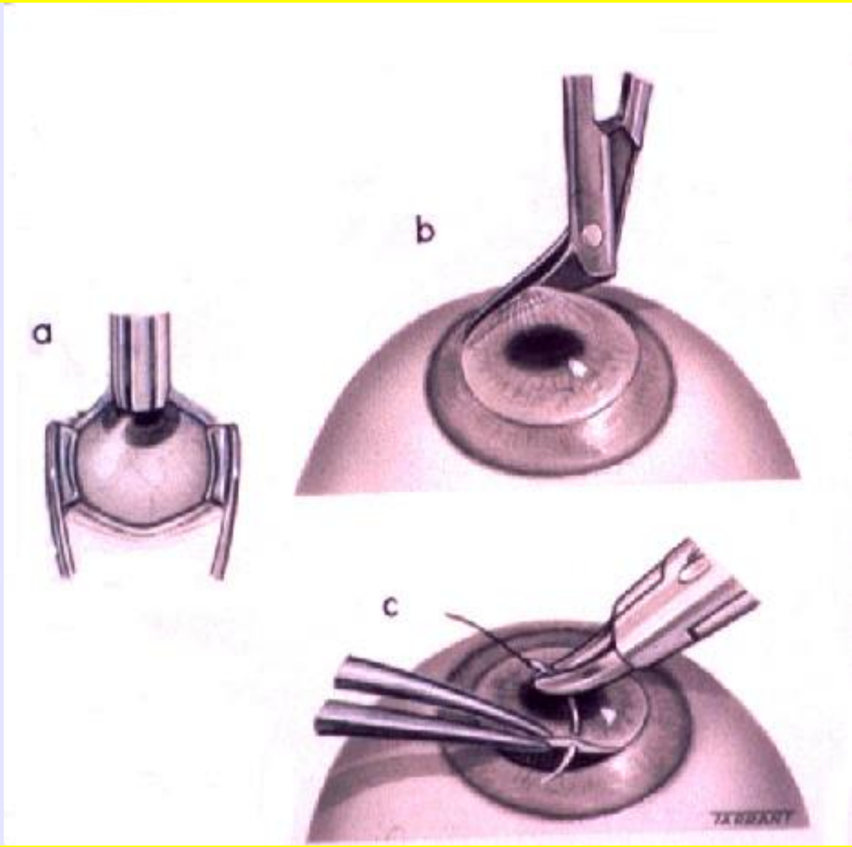
Corneal Graft



Technique of penetrating keratoplasty



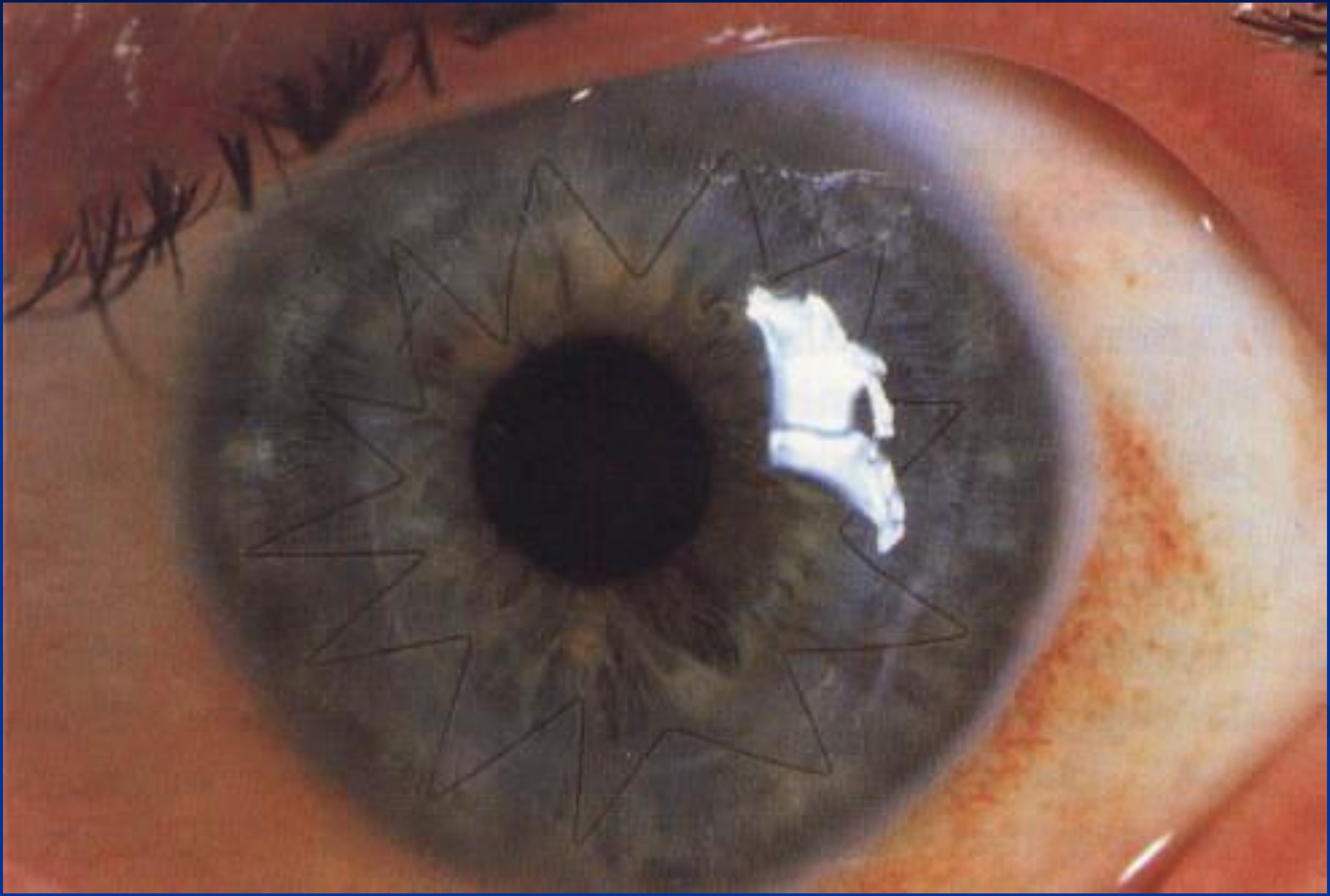
Excision of donor tissue



a, b - Excision of host tissue

c - Fixation of donor tissue

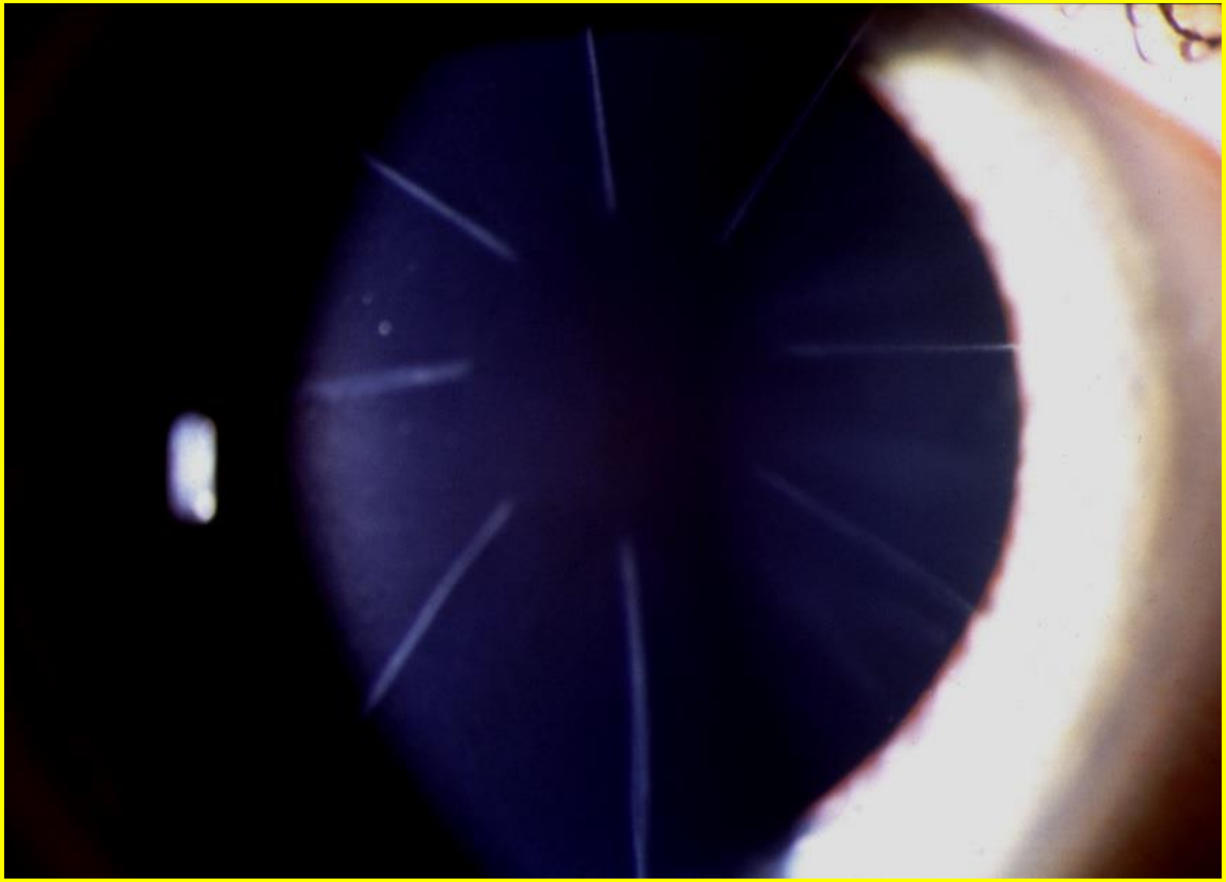
Corneal Graft



Radial keratotomy

Decreases myopia by flattening cornea·

Deep incisions from edge of optical zone to limbus·

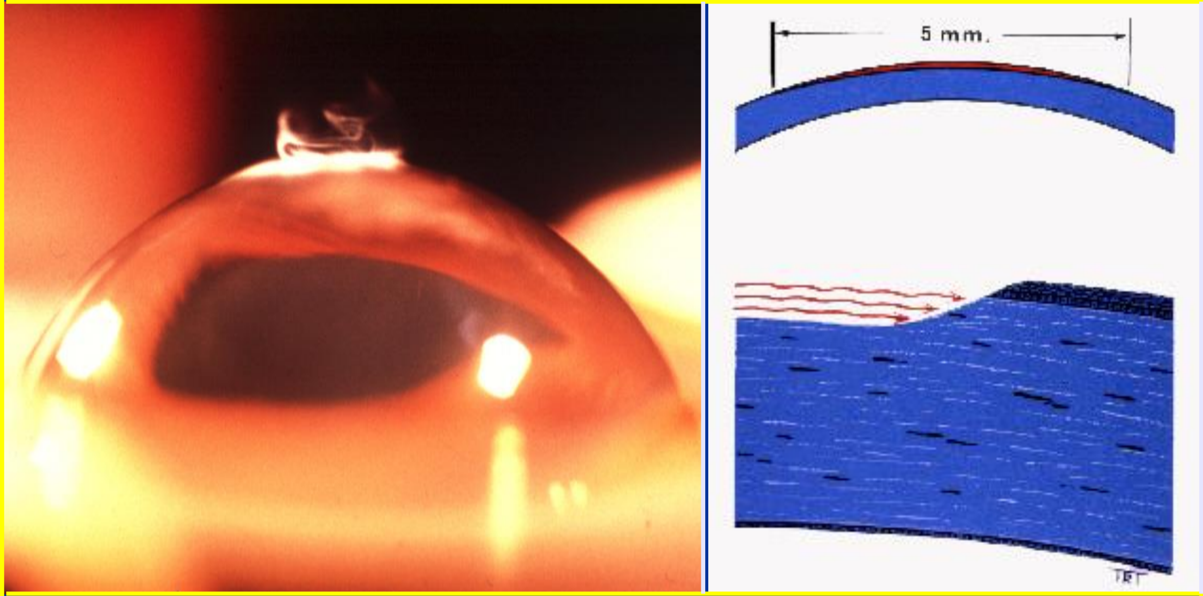
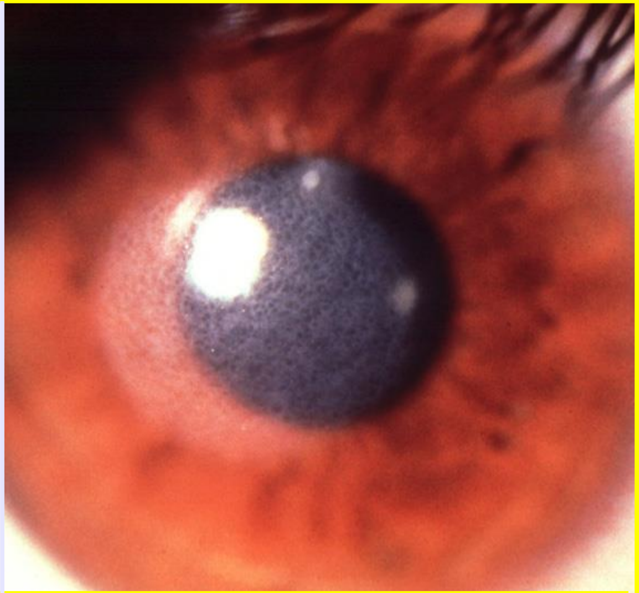


Main indications	Main complications
· Stable myopia of up to 8D	· Accidental perforation
· Otherwise normal cornea	· Intrastromal epithelial cysts

Photorefractive keratectomy (PRK)

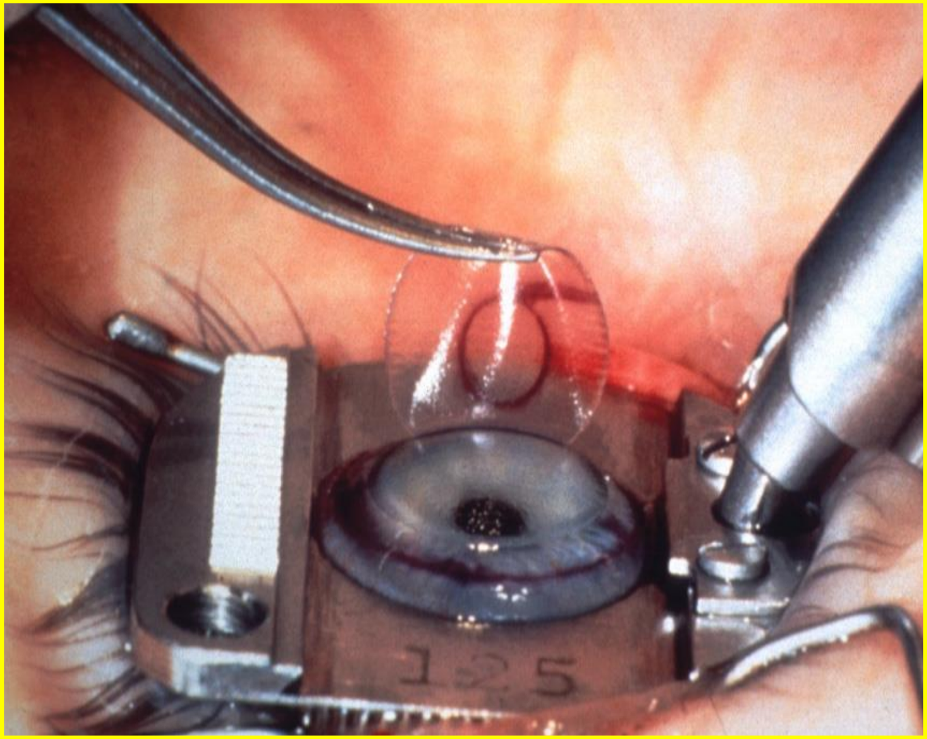
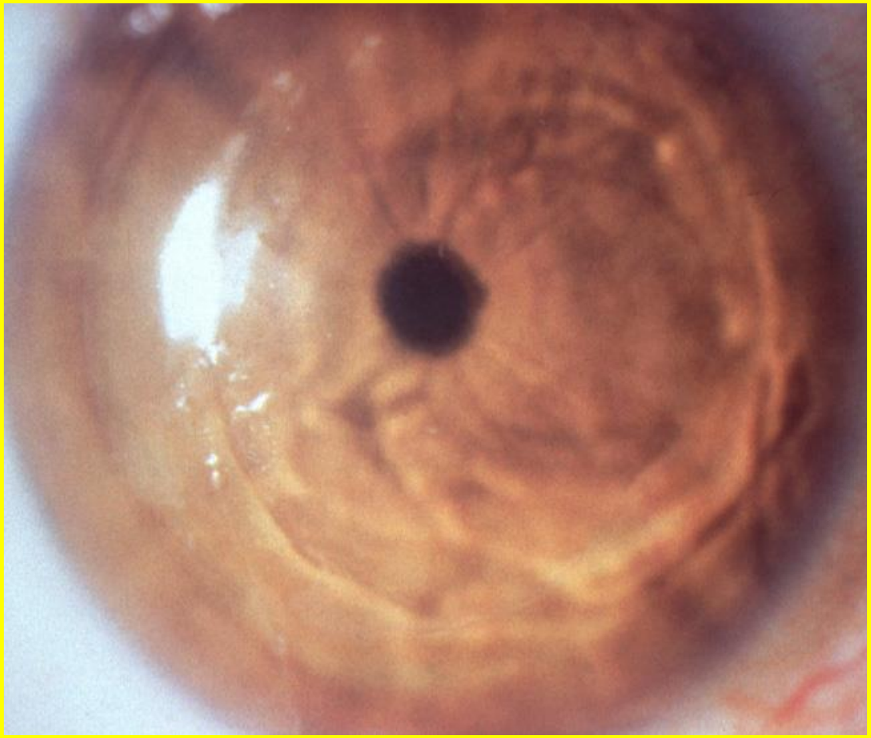
Indications

- Stable myopia up to 6D with astigmatism no more than 3D
- Hypermetropia up to 2.5D

Technique	Main complication
	
Reshaping of cornea by excimer laser ablation of Bowman layer and anterior stroma	Subepithelial haze which usually resolves after 1-6 months

Laser *in-situ* keratomileusis (LASIK)

Indications - similar to PRK but corrects higher degrees of myopia

Technique	Complications
	
• Thin flap of cornea fashioned • Bed treated with excimer laser • Flap repositioned	• Wrinkles in flap • Cellular interface proliferation

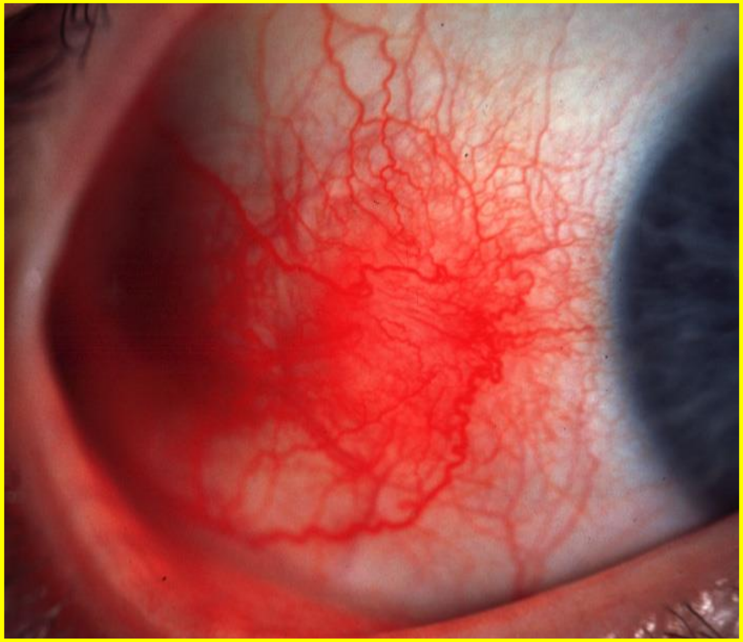
SCLERA

EPISCLERITIS AND SCLERITIS

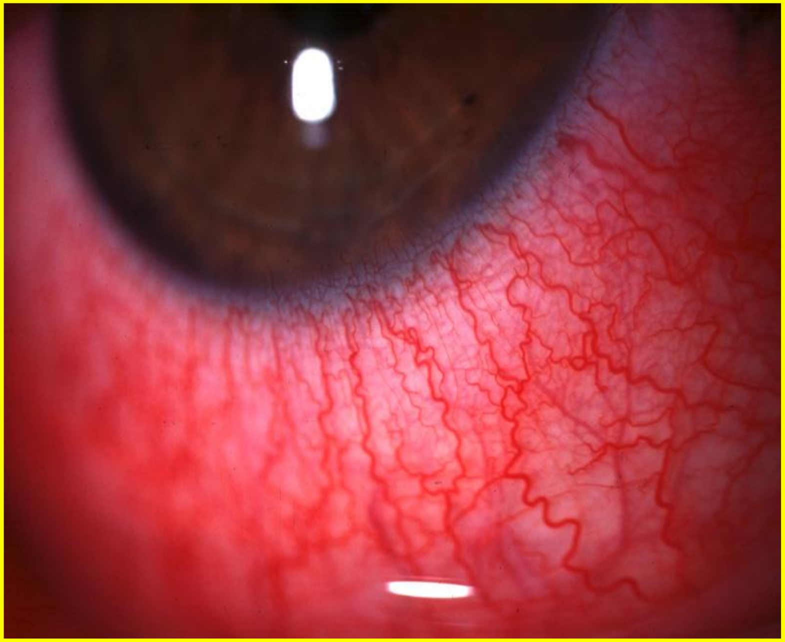
1. **Episcleritis**
    - Simple
    - Nodular
2. **Anterior scleritis**
    - Non-necrotizing diffuse
    - Non-necrotizing nodular
    - Necrotizing with inflammation
    - Necrotizing without inflammation (scleromalacia perforans)
3. **Posterior scleritis**

Simple episcleritis

- Common, benign, self-limiting but frequently recurrent
- Typically affects young adults
- Seldom associated with a systemic disorder



Simple sectorial episcleritis



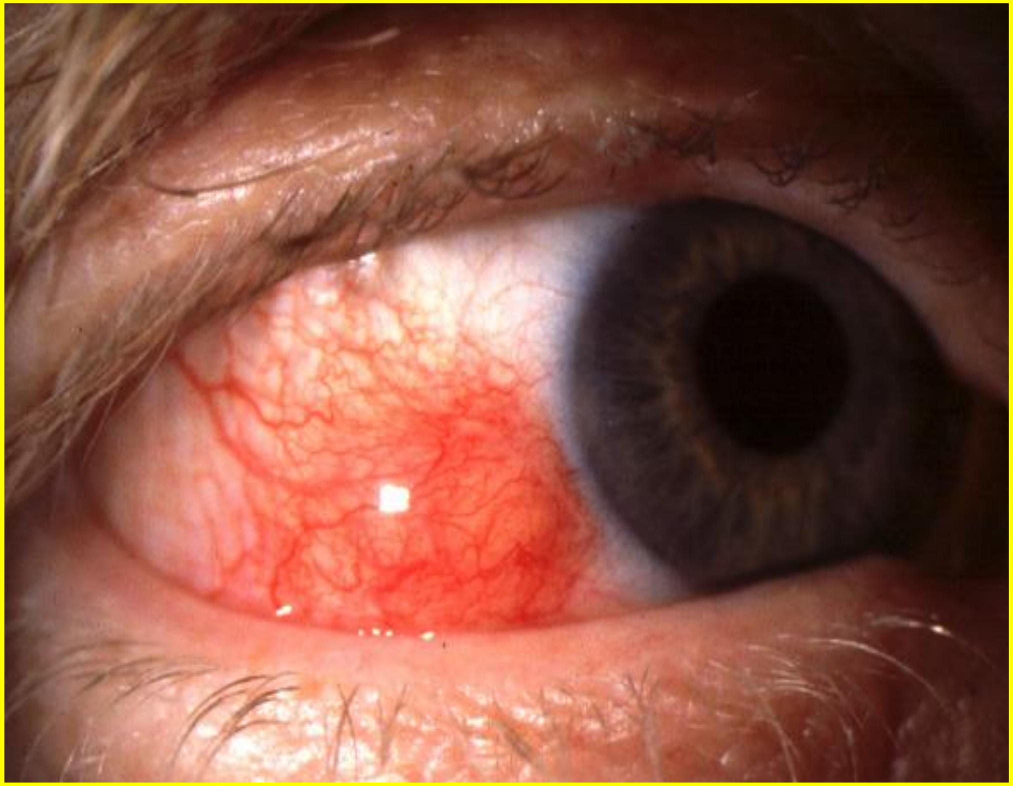
Simple diffuse episcleritis

Treatment

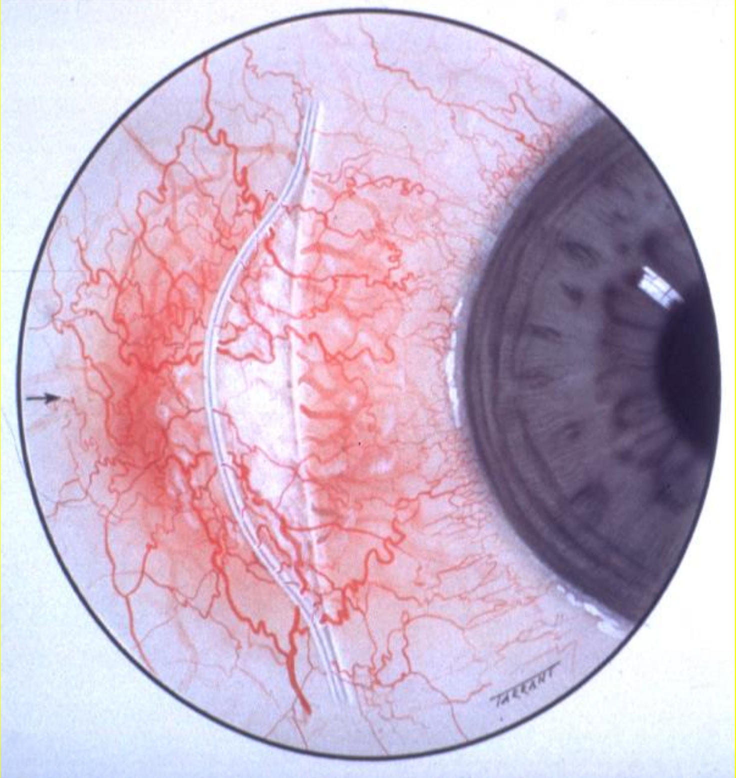
- Topical steroids
- Systemic flurbiprofen (00 mg tid if unresponsive

Nodular episcleritis

- Less common than simple episcleritis
- May take longer to resolve
- Treatment - similar to simple episcleritis



Localized nodule which can be moved over sclera



Deep scleral part of slit-beam not displaced

Causes and Systemic Associations of Scleritis

1. Rheumatoid arthritis

2. Connective tissue disorders

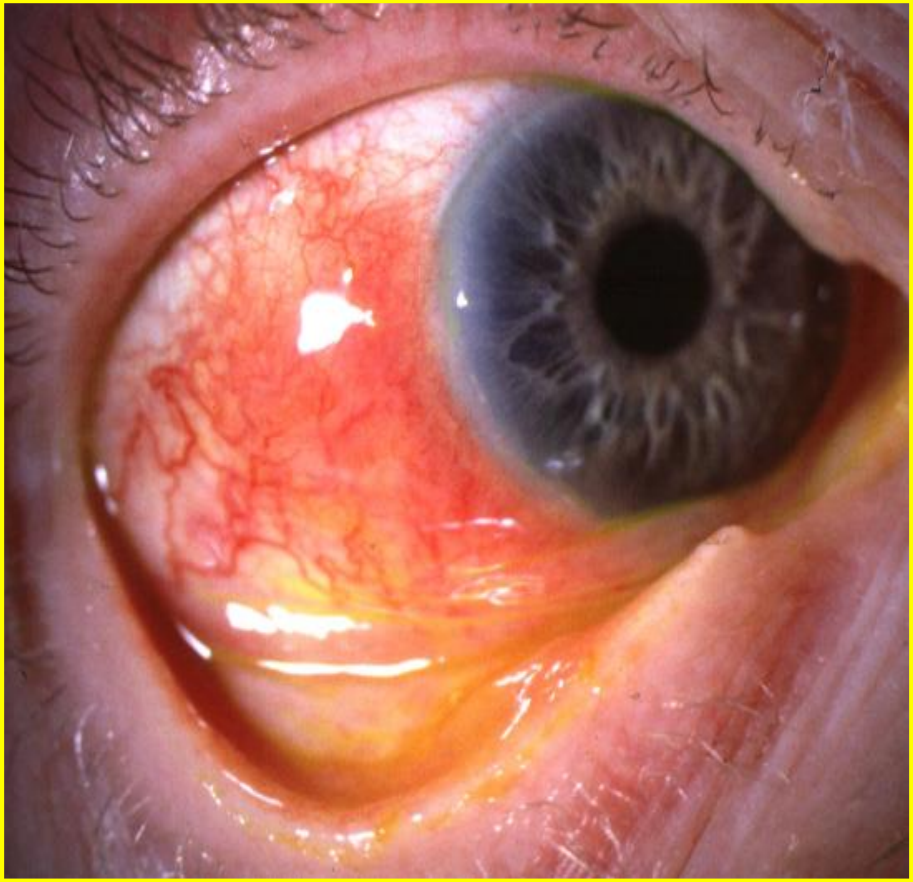
- Wegener granulomatosis
- Polyteritis nodosa
- Systemic lupus erythematosus

3. Miscellaneous

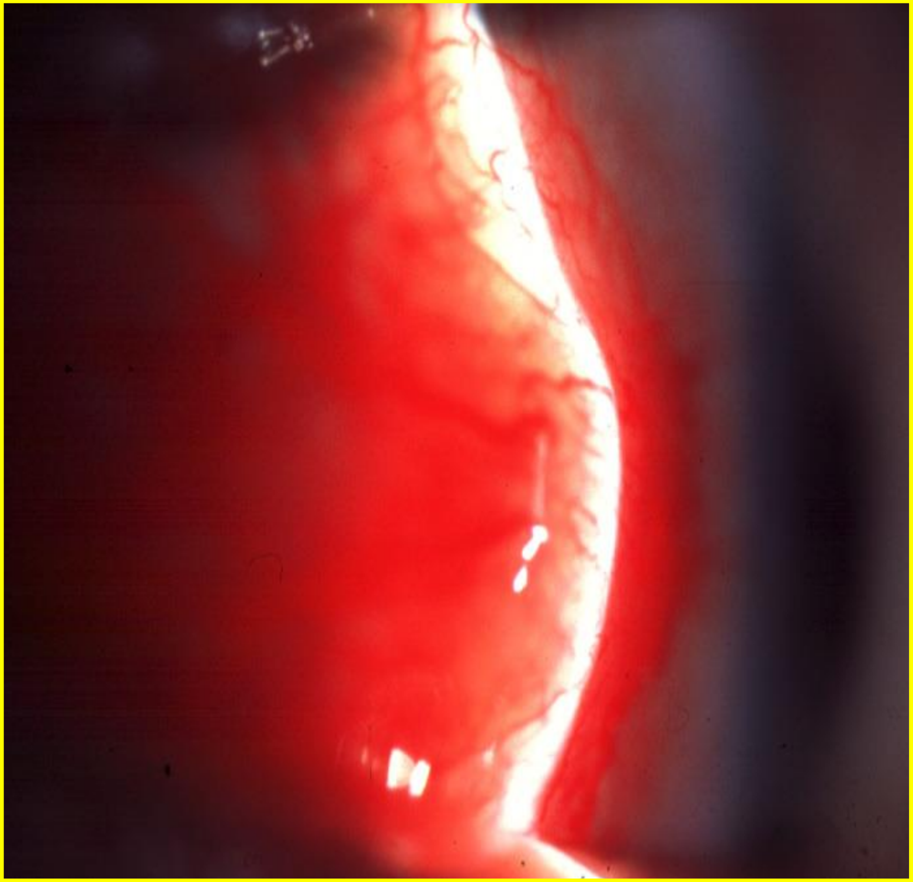
- Relapsing polychondritis
- Herpes zoster ophthalmicus
- Surgically induced

Nodular anterior non-necrotizing scleritis

More serious than diffuse scleritis



On cursory examination resembles nodular episcleritis



Scleral nodule cannot be moved over underlying tissue

Treatment - similar to diffuse non-necrotizing scleritis

CRYSTALLINE LENS

ACQUIRED CATARACT

1. Classification of age-related cataract
    - Morphological
    - According to maturity
2. Other causes of cataracts
    - Diabetes
    - Myotonic dystrophy
    - Atopic dermatitis
    - Trauma
    - Drugs
    - Secondary (complicated)
3. Surgery
    - Large incision extracapsular extraction
    - Phacoemulsification

Classification of Age-related Cataract According to Morphology

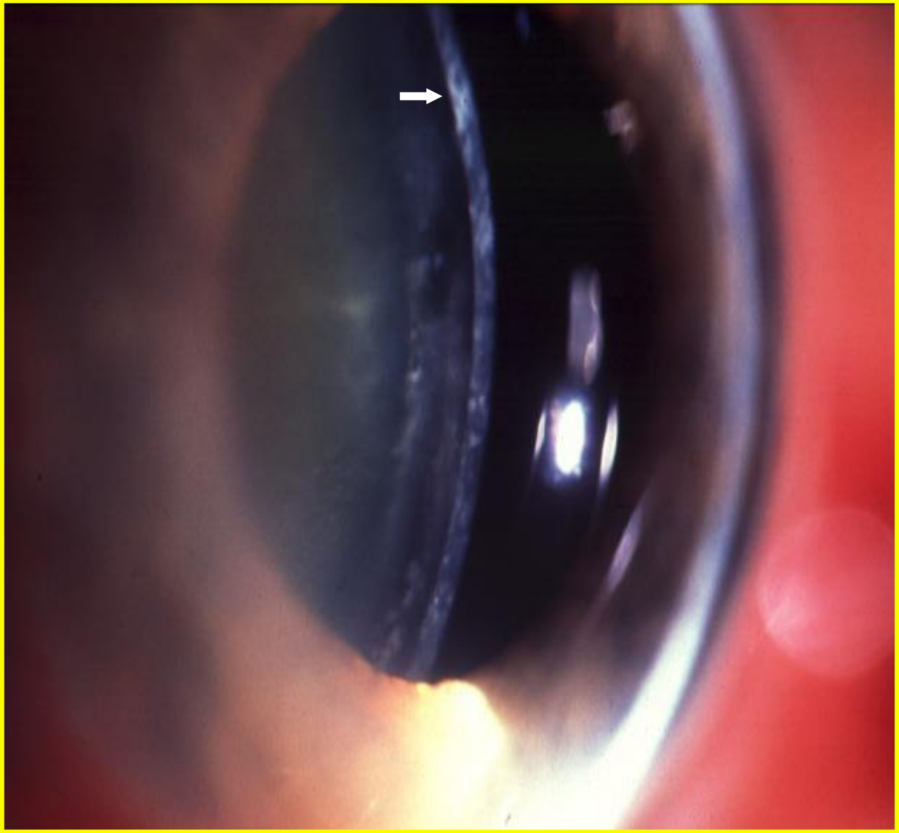
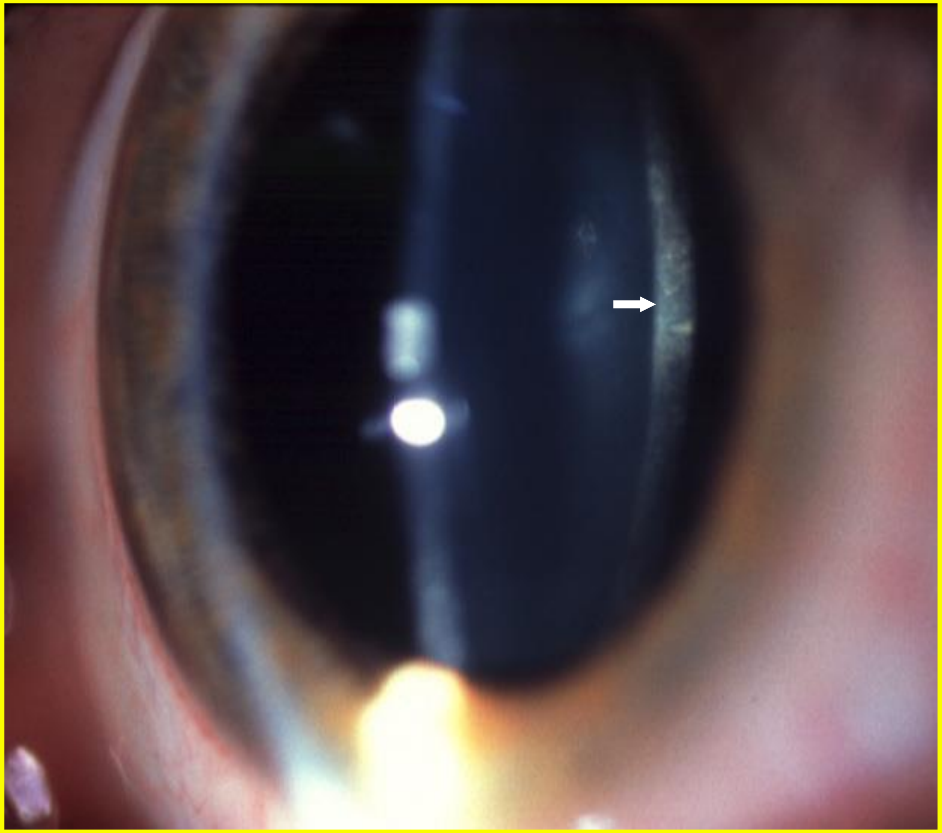
1. Subcapsular
    - Anterior
    - Posterior

2. Nuclear

3. Cortical

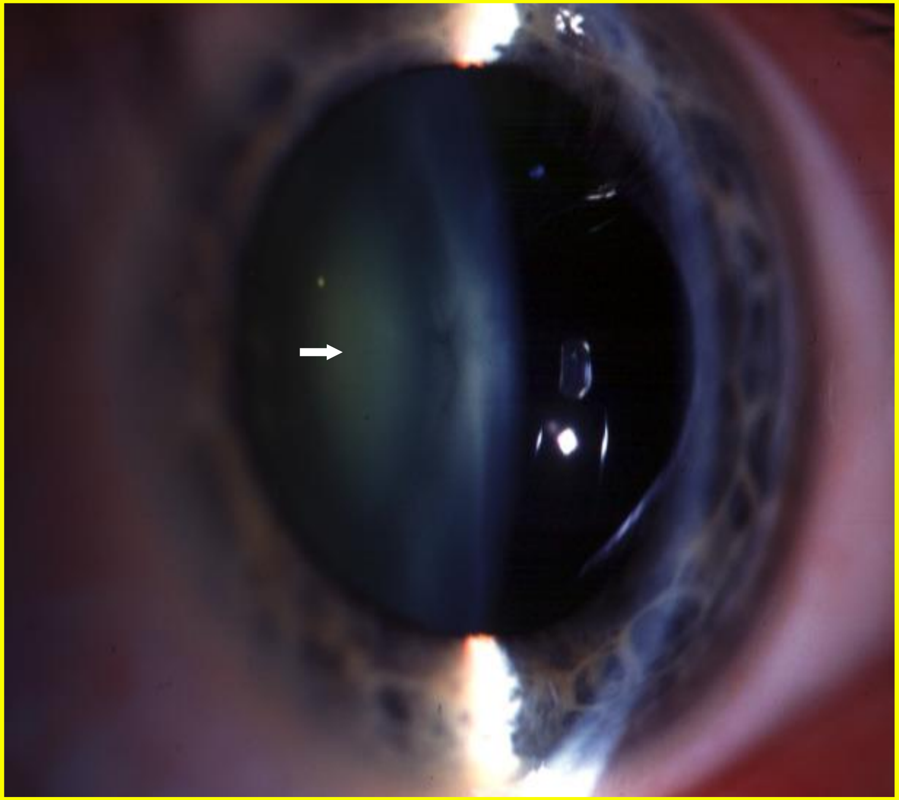
4. Christmas tree

Subcapsular cataract

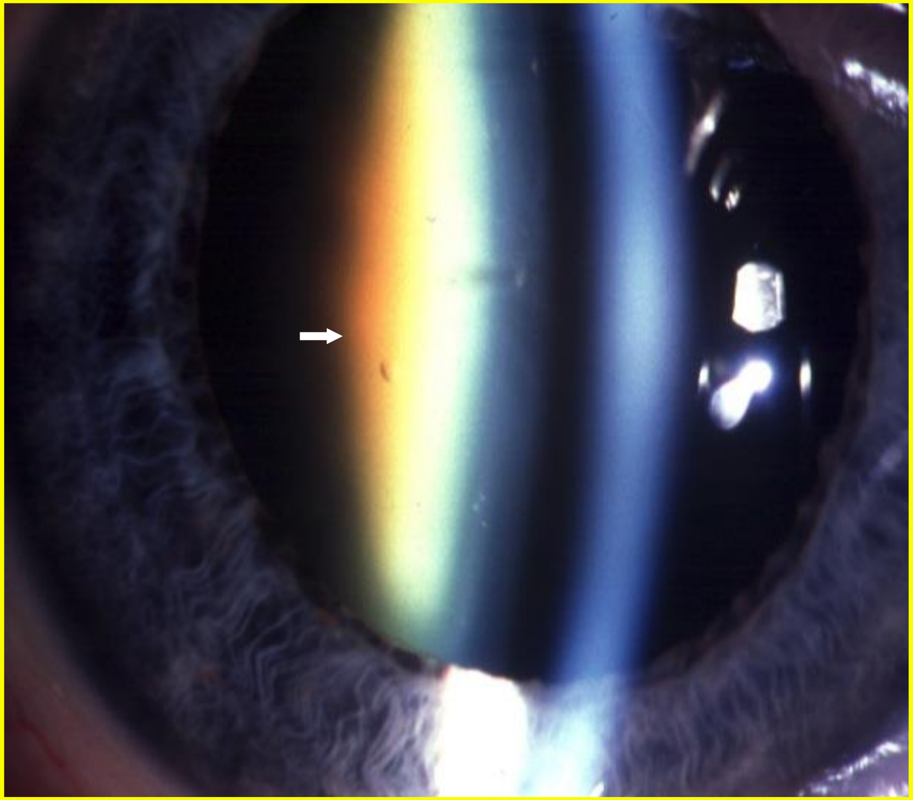
Anterior	Posterior
	

Nuclear cataract

Progression



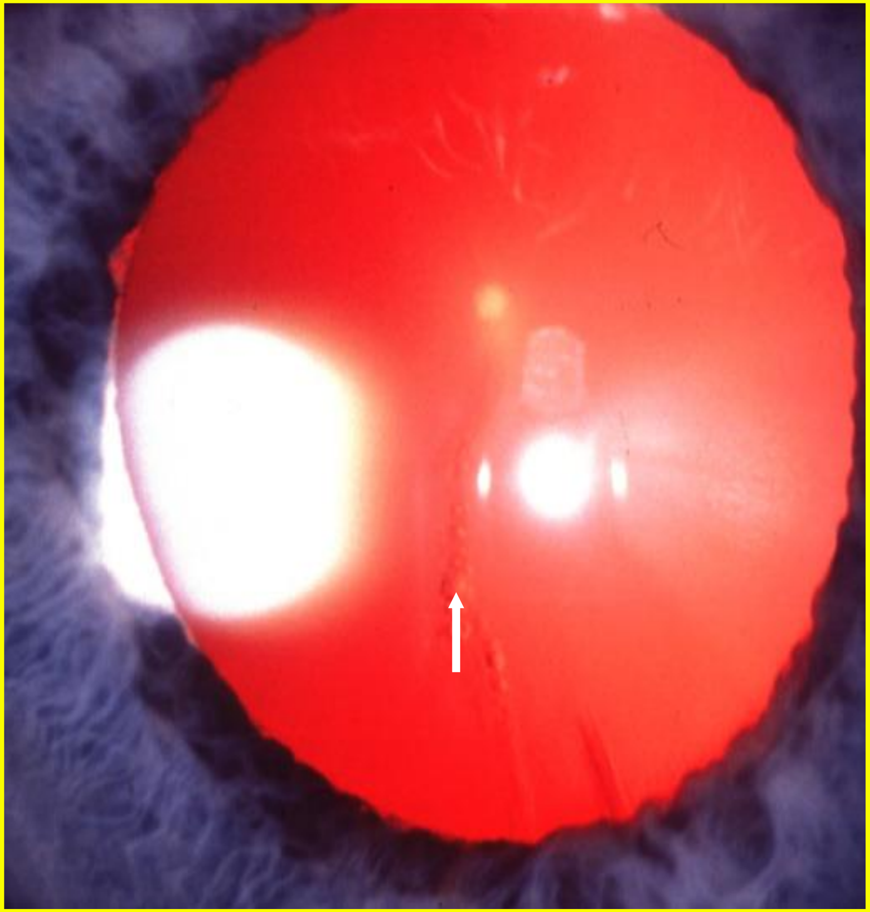
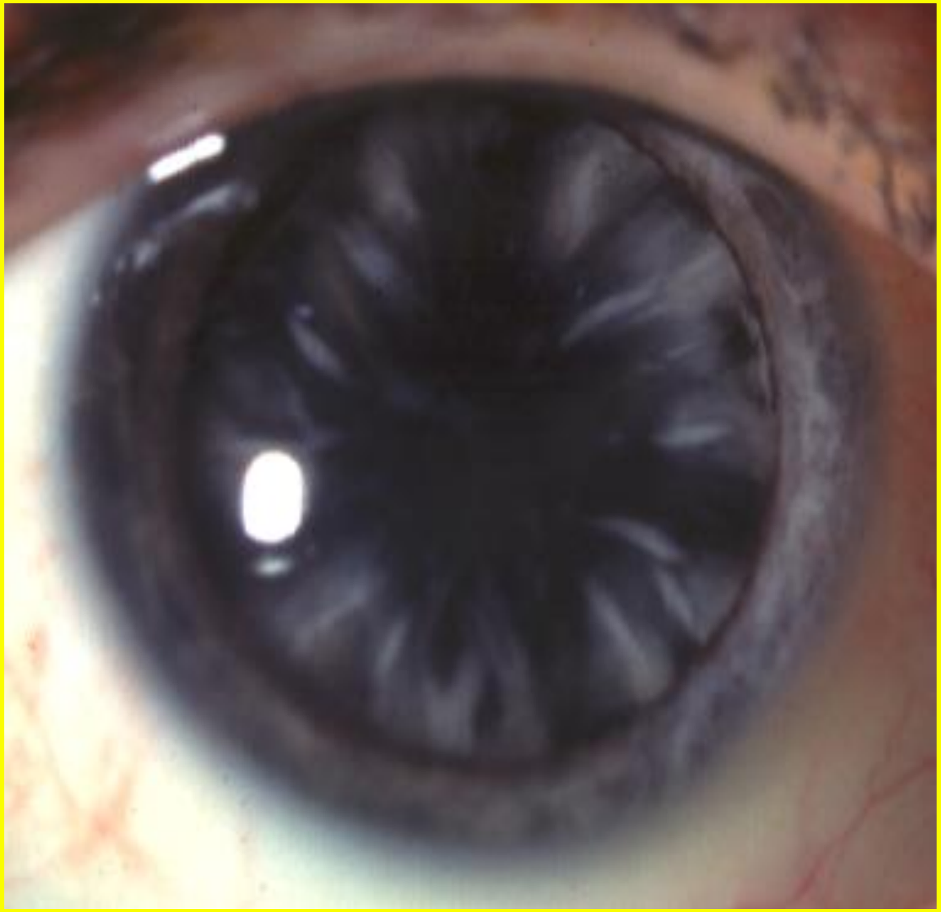
- Exaggeration of normal nuclear ageing change
- Causes increasing myopia



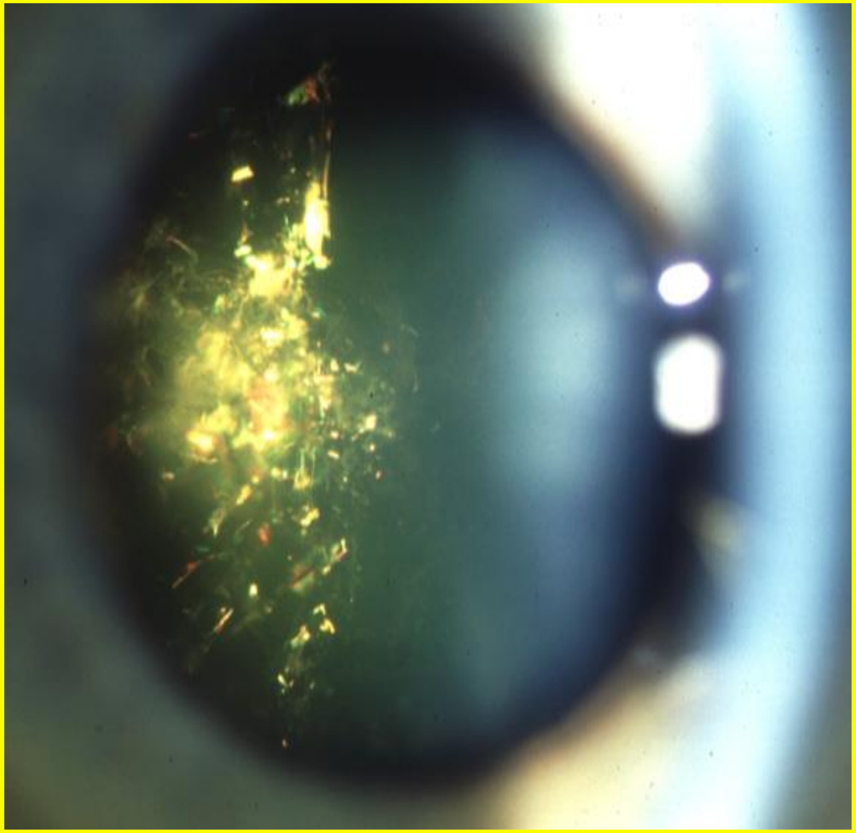
- Increasing nuclear opacification
- Initially yellow then brown

Cortical cataract

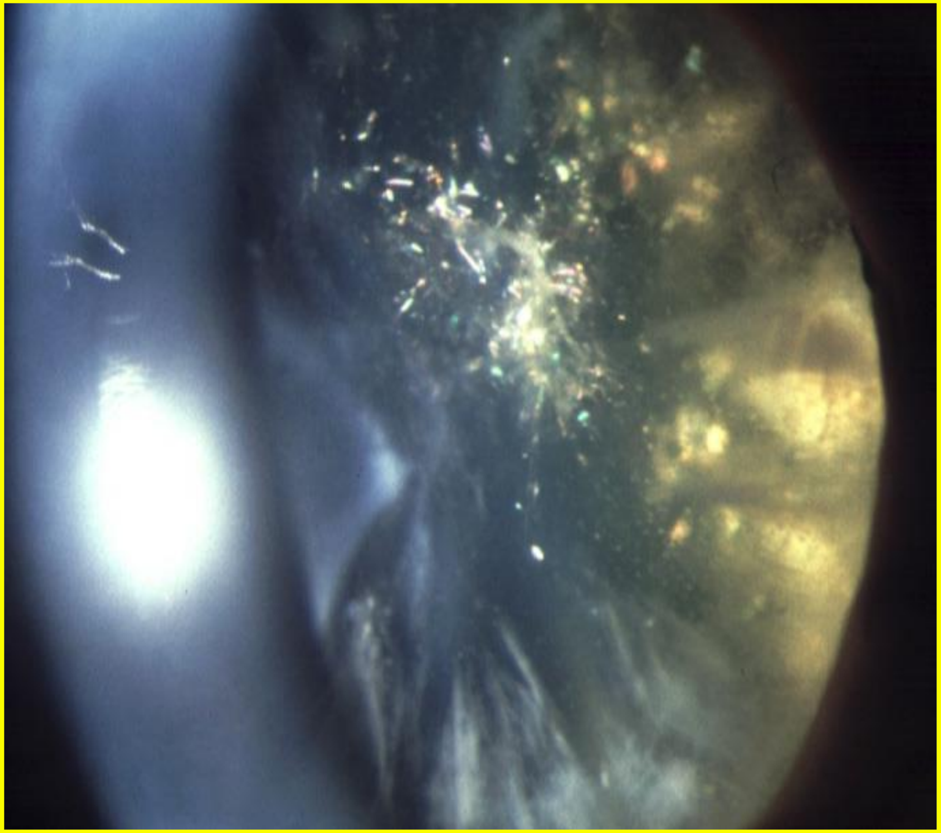
Progression

	
Initially vacuoles and clefts	Progressive radial spoke-like opacities

Christmas tree cataract

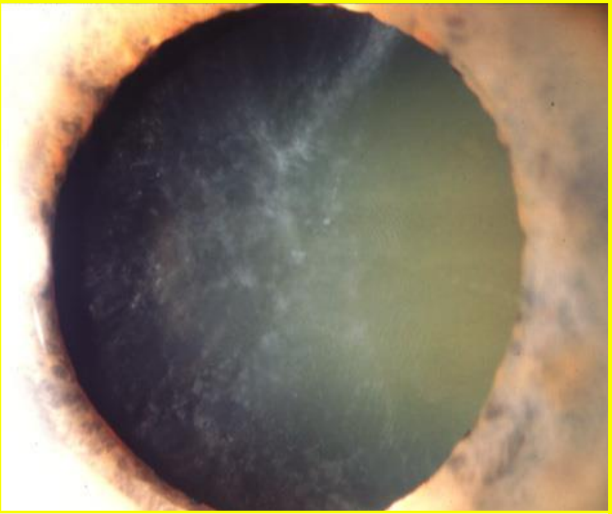


Polychromatic, needle-like opacities

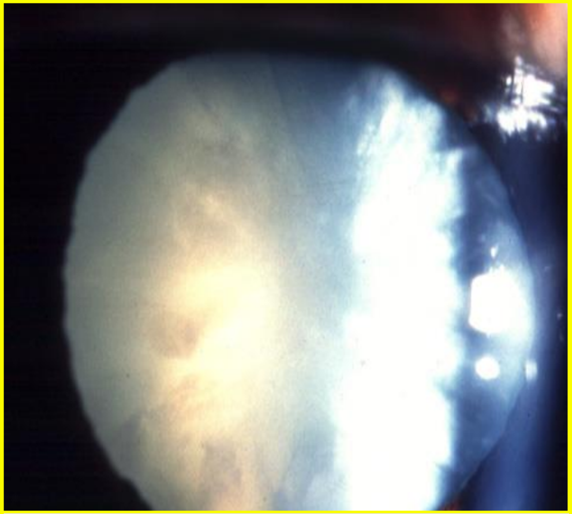


May co-exist with other opacities

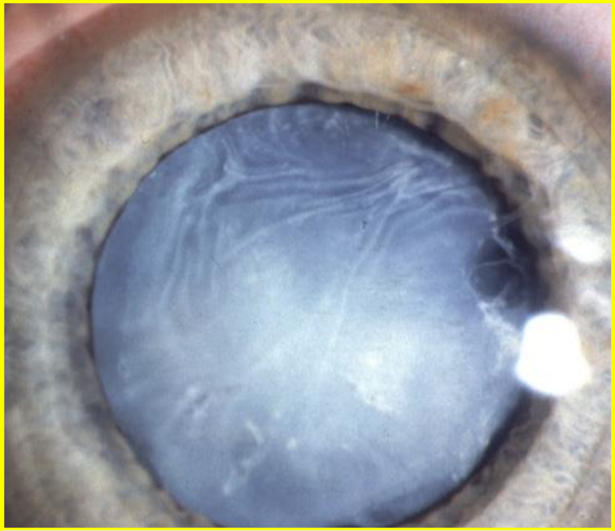
Classification according to maturity



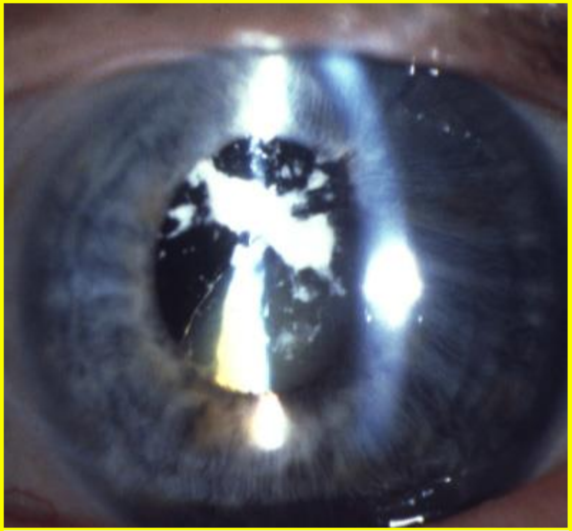
Immature



Mature

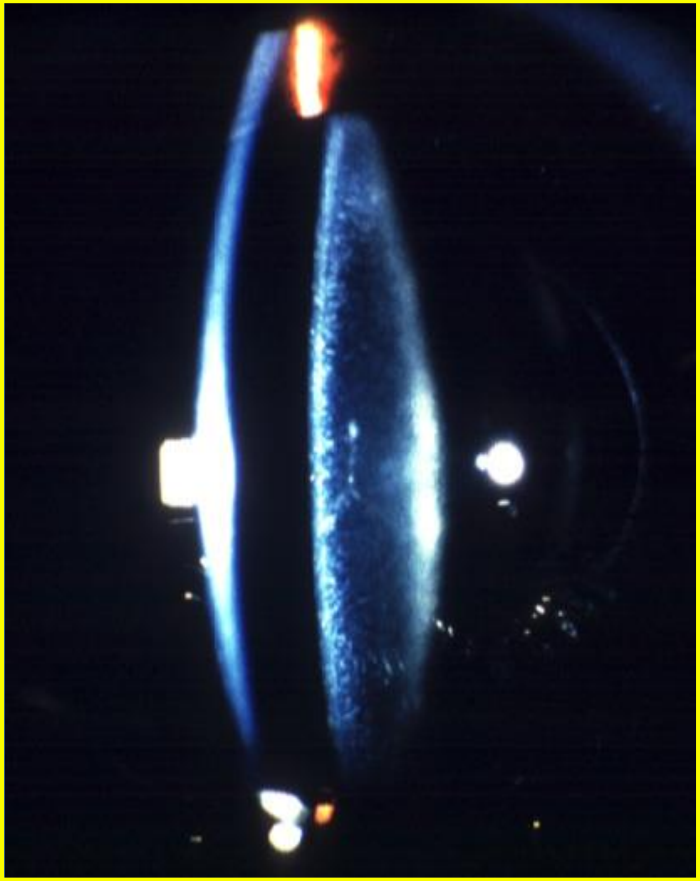
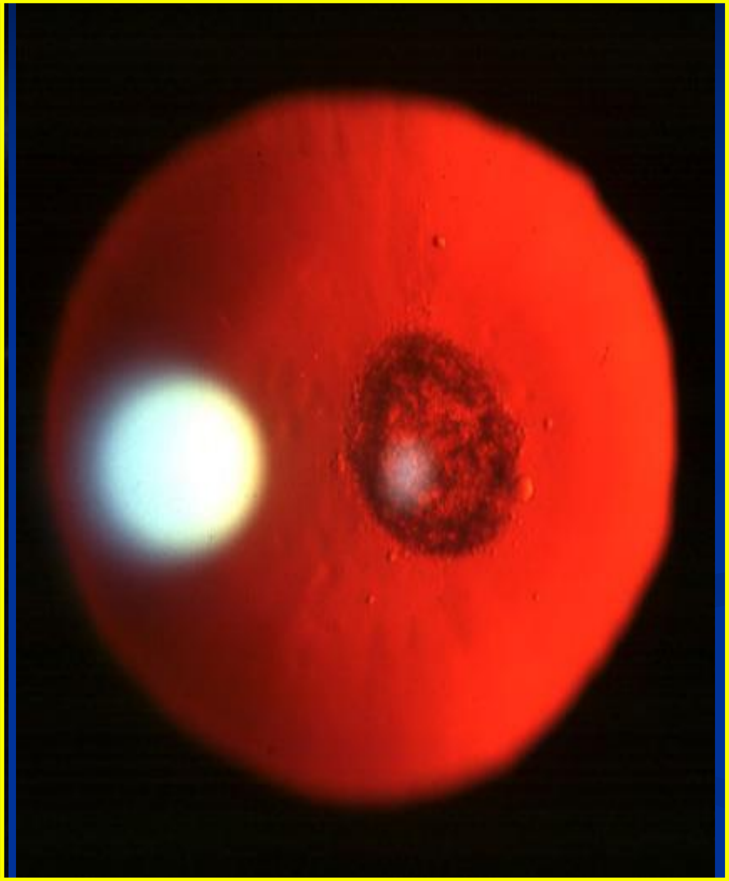


Hypermature

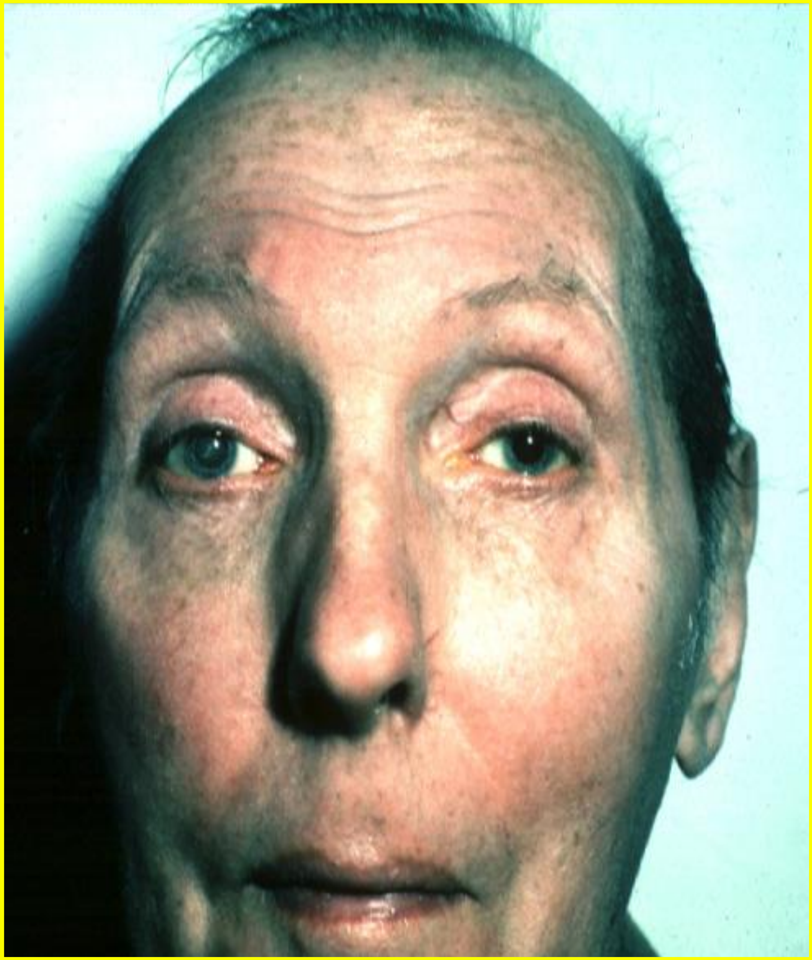


Morgagnian

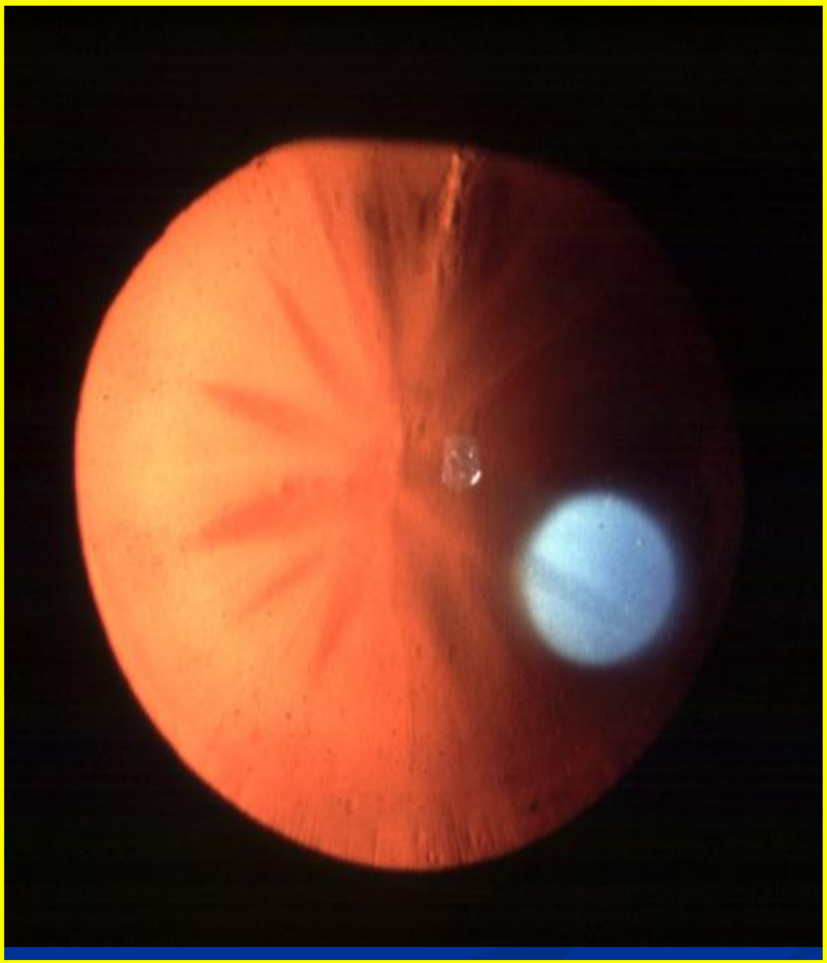
Other causes of cataract - diabetes

Juvenile	Adult
	
• White punctate or snowflake posterior or anterior opacities • May mature within few days	• Cortical and subcapsular opacities • May progress more quickly than in non-diabetics

Other causes of cataract - myotonic dystrophy

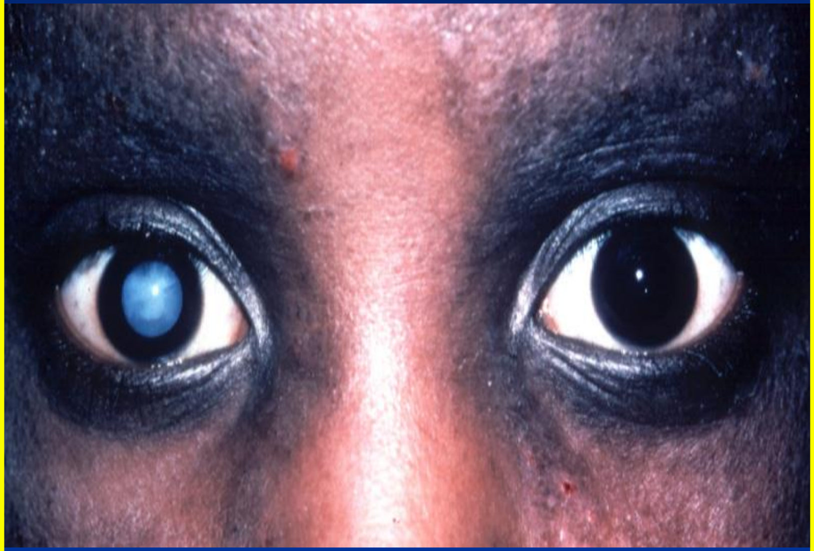


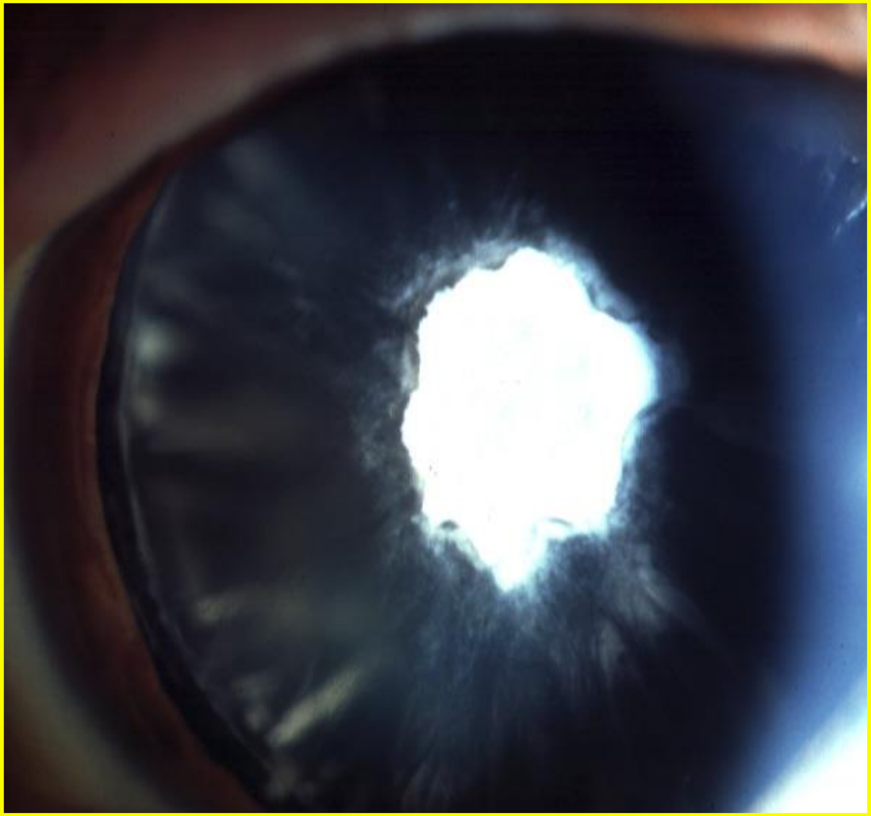
- Myotonic facies
- Frontal balding



- Stellate posterior subcapsular opacity
  - 90% of patients after age 20 years
- No visual problem until age 40 years

Other causes of cataract - atopic dermatitis



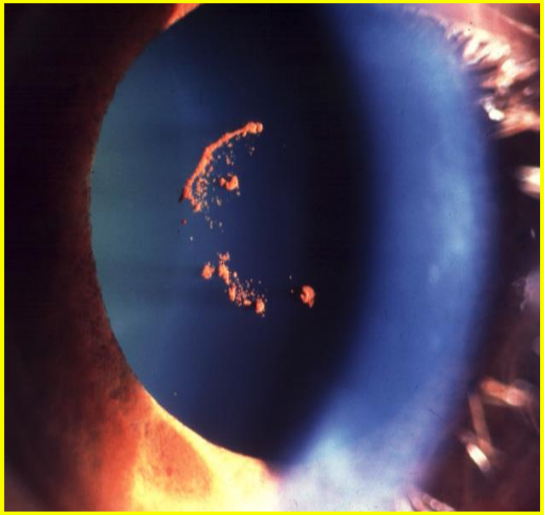


- Cataract develops in 10% of cases between 15-30 years
- Bilateral in 70%
- Frequently becomes mature

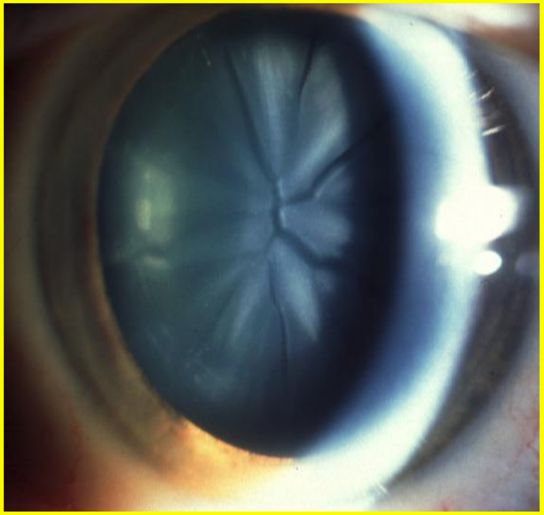
- Anterior subcapsular plaque (shield cataract)
- Wrinkles in anterior capsule

Causes of traumatic cataract

Concussion

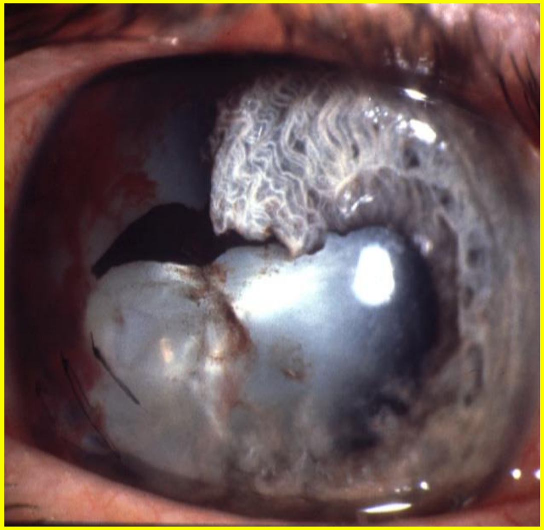


'Vossius' ring from imprinting of iris pigment



Flower-shaped

Penetration



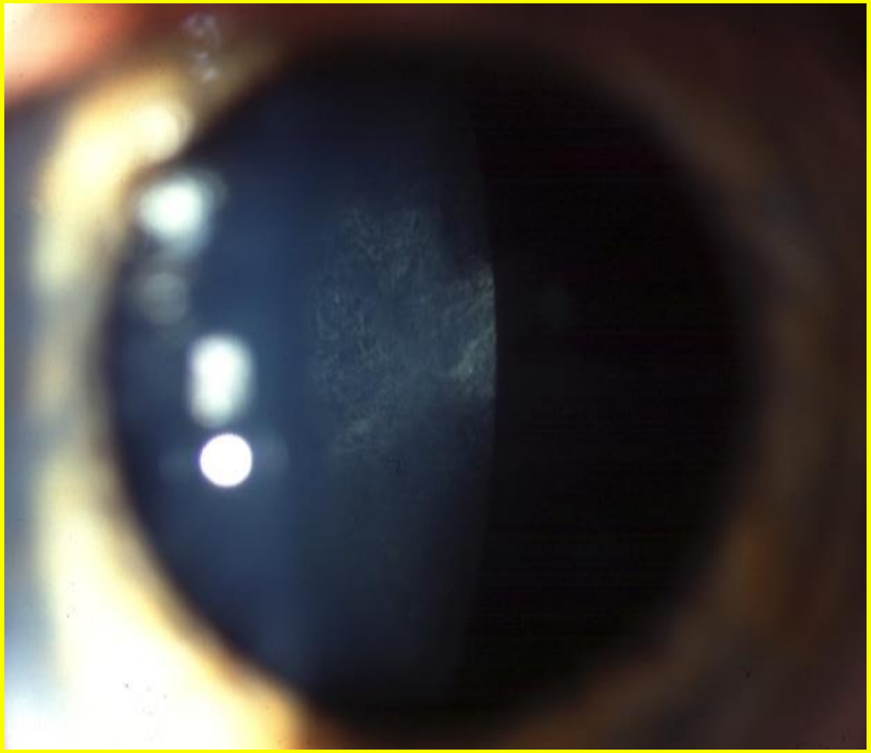
Other causes

- Ionizing radiation
- Electric shock
- Lightning

Drugs

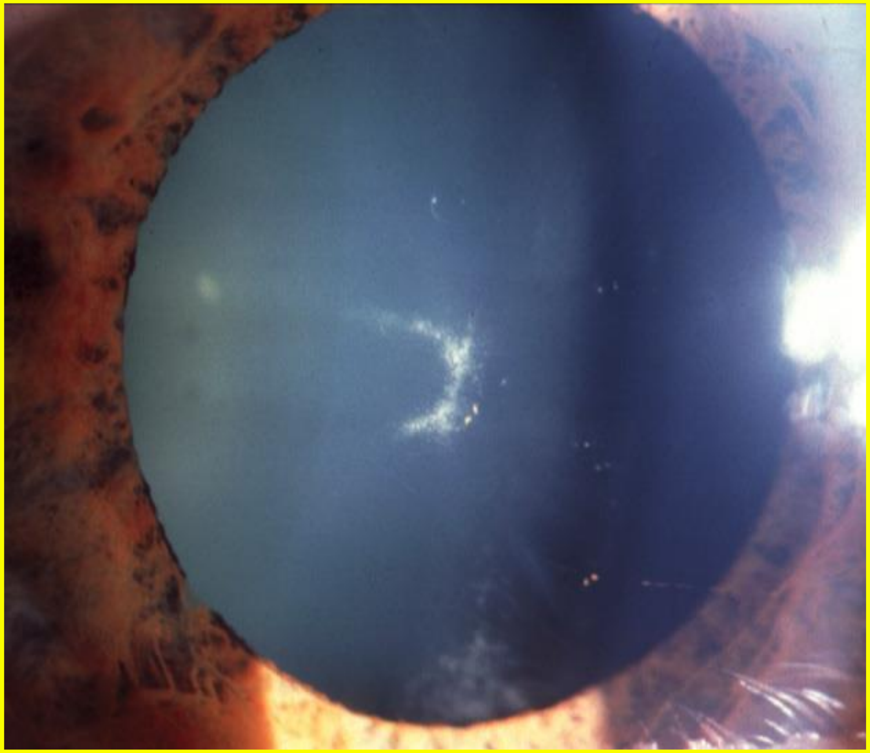
Systemic or topical steroids

- initially posterior subcapsular



Chlorpromazine

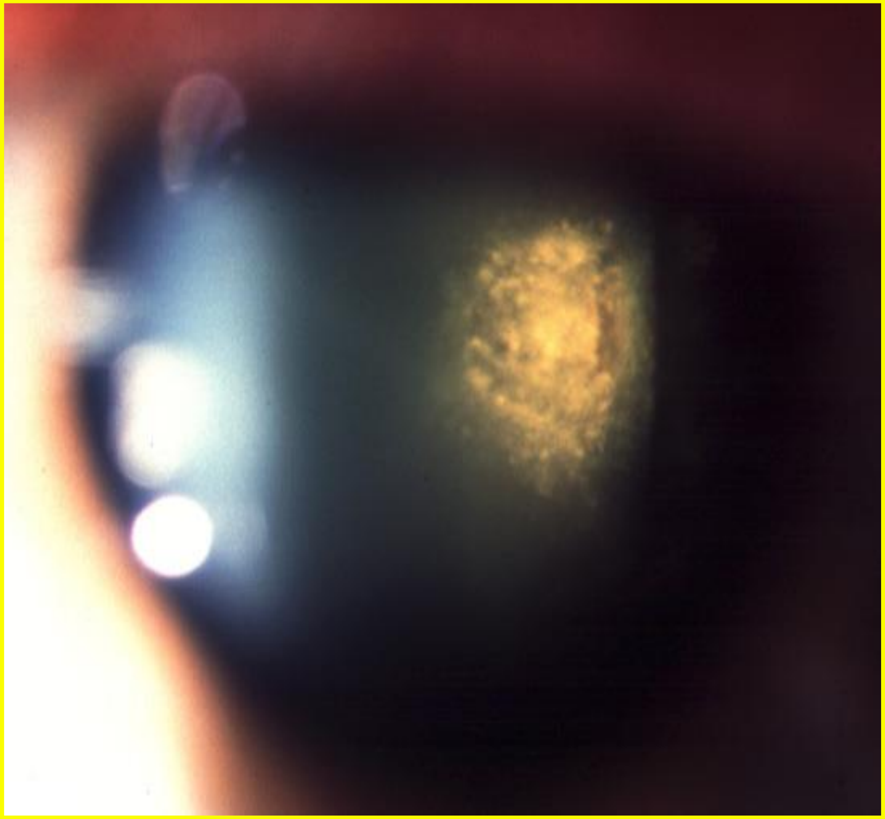
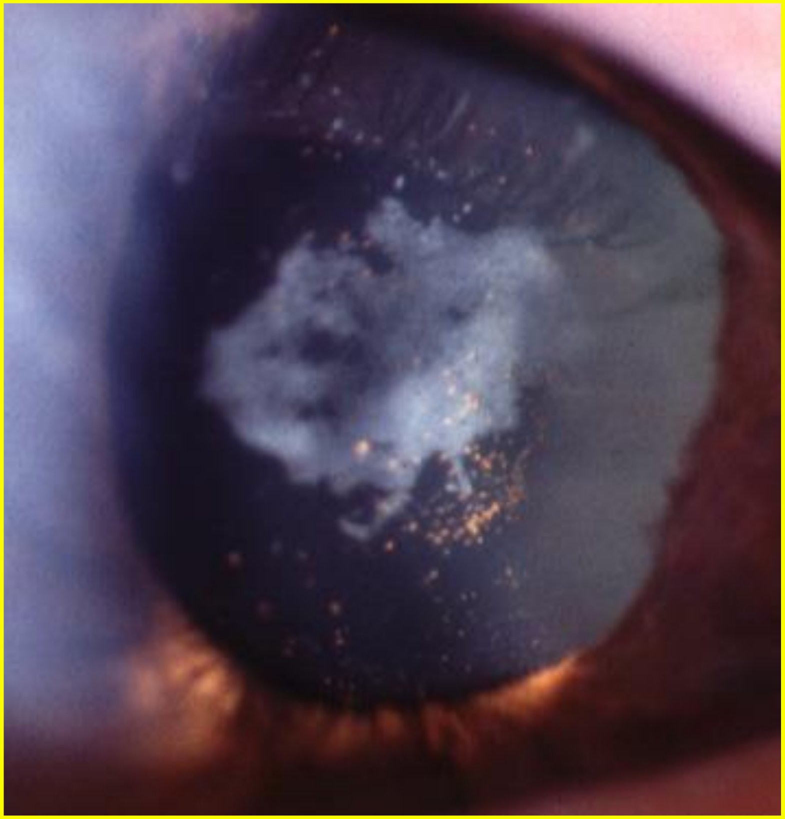
- central, anterior capsular granules



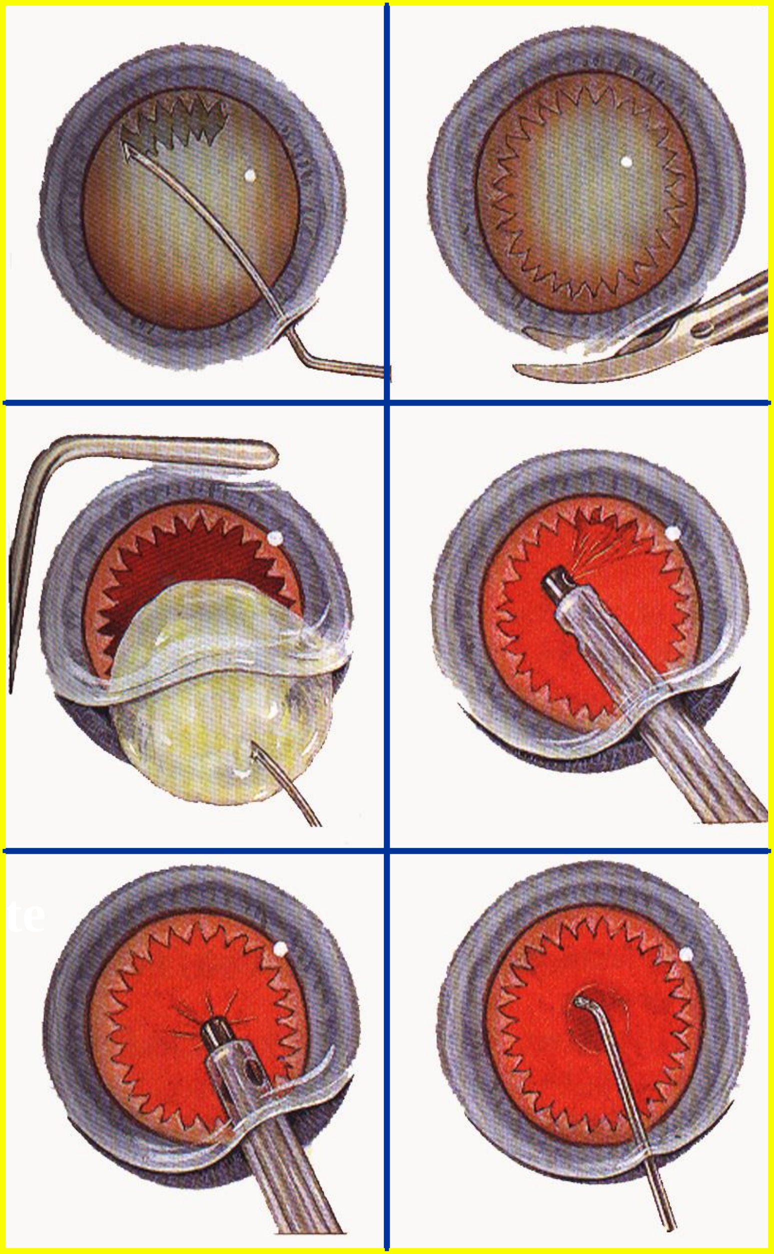
Other drugs

- Long-acting miotics
- Amiodarone
- Busulphan

Secondary (complicated) cataract

Posterior subcapsular	Glaukomflecken
	
• Chronic anterior uveitis • High myopia • Hereditary fundus dystrophies	• Follows acute angle-closure glaucoma • Central, anterior subcapsular opacities

Extracapsular cataract extraction



1. Anterior capsulotomy

2. Completion of incision

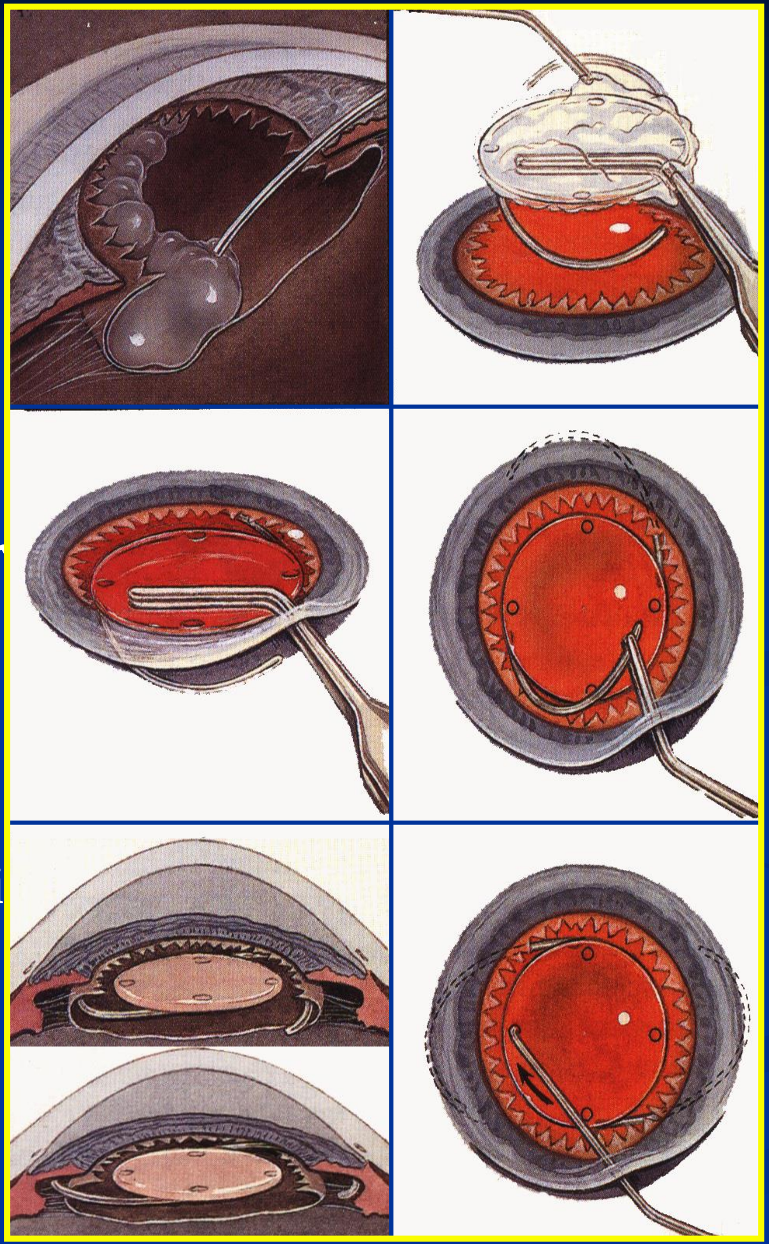
3. Expression of nucleus

4. Cortical cleanup

5. Care not to aspirate posterior capsule accidentally

6. Polishing of posterior capsule, if appropriate

Extracapsular cataract extraction (cont.)



7. Injection of viscoelastic
substance

8. Grasping of IOL
And coating with
Viscoelastic substance

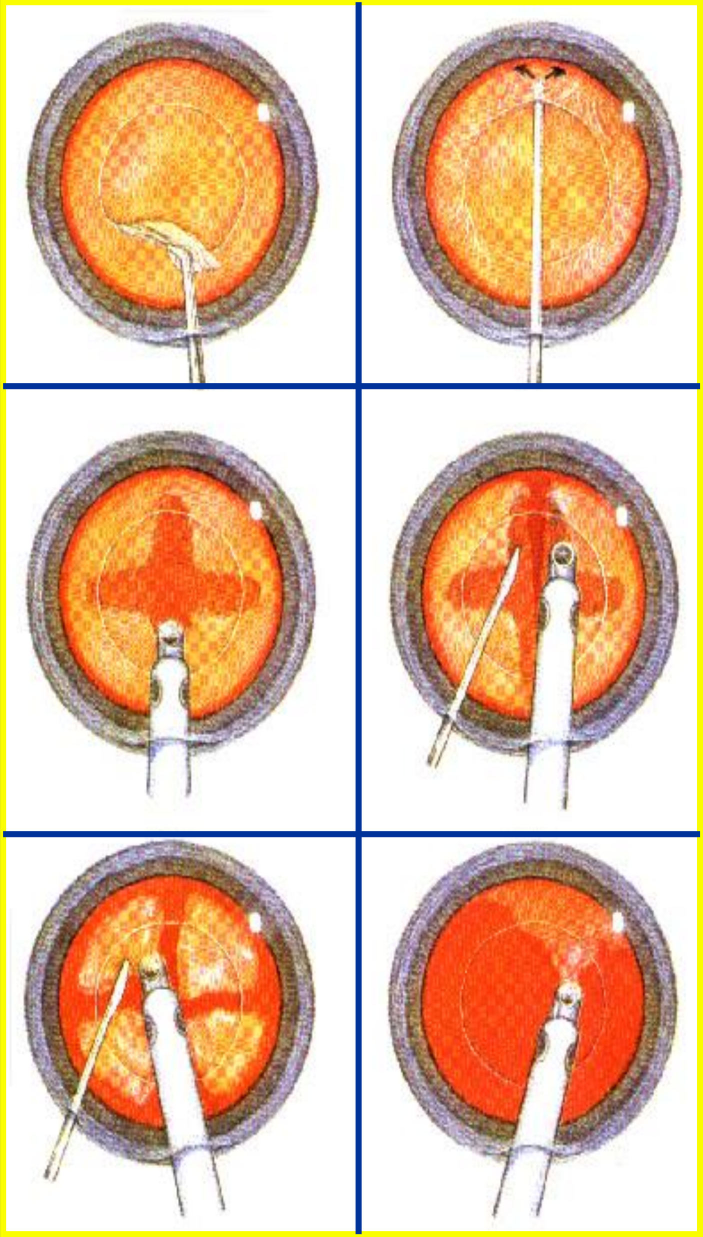
9. Insertion of inferior
haptic and optic

10. Insertion of
superior haptic

11. Placement of hapti
into capsular bag
and not into
Ciliary sulcus

12. Dialling of IOL into
horizontal position

Phacoemulsification



1. Capsulorrhexis

2. Hydrodissection

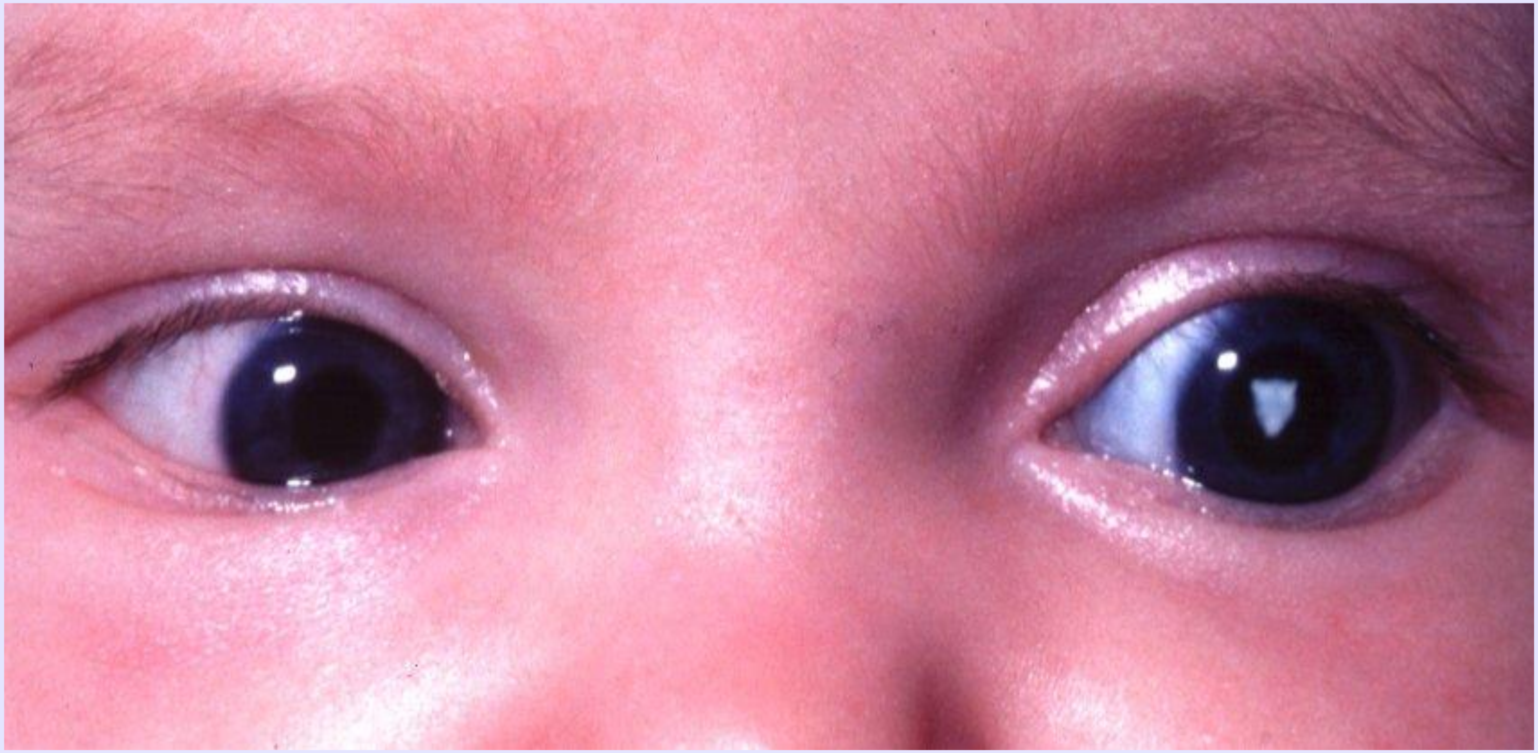
. Sculpting of nucleus

4. Cracking of nucleus

5. Emulsification of
each quadrant

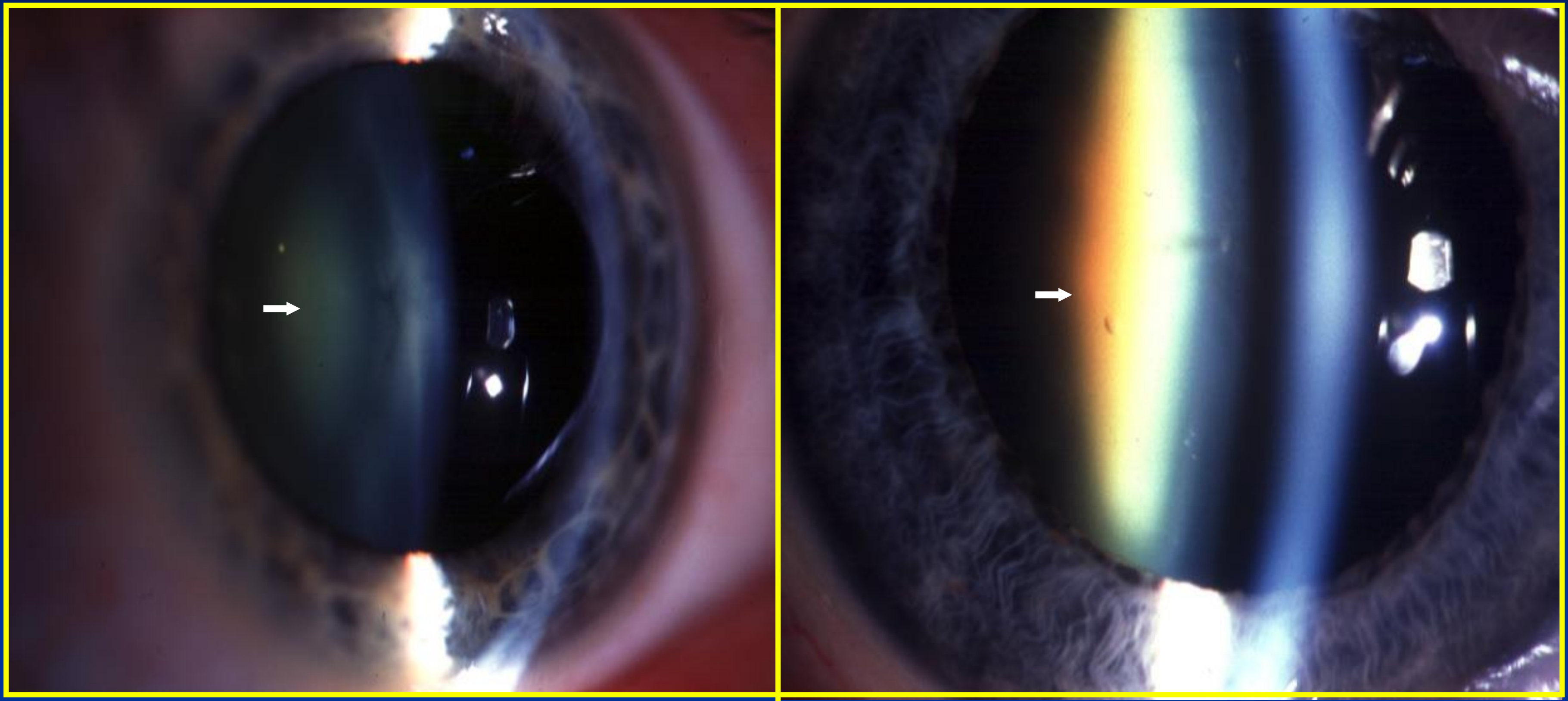
6. Cortical cleanup and
insertion of IOL

Congenital Cataract



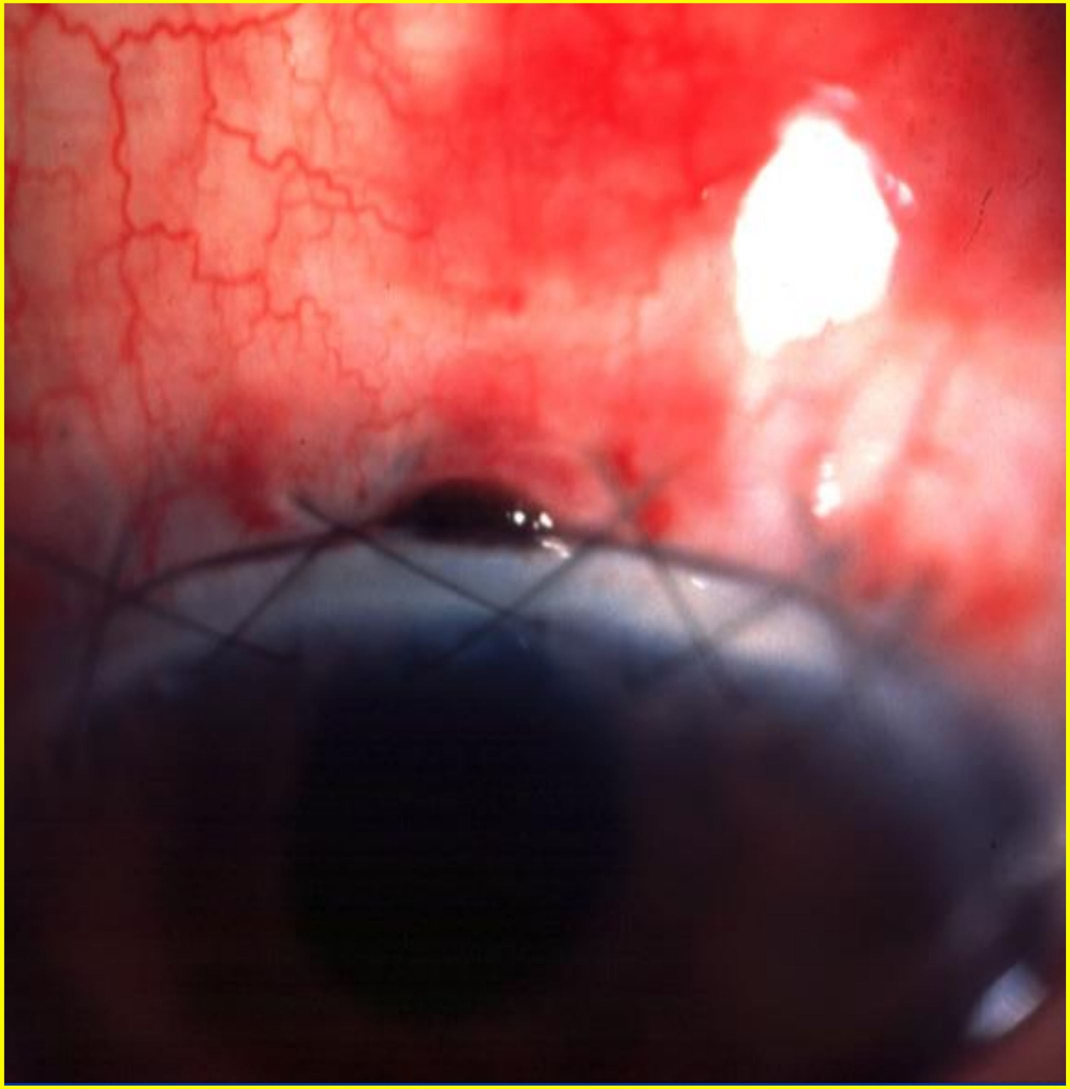
- 33% - idiopathic - may be unilateral or bilateral
- 33% - inherited - usually bilateral
- 33% - associated with systemic disease - usually bilateral
- Other ocular anomalies present in 50%

Senile Cataract



Early postoperative complications

Iris prolapse



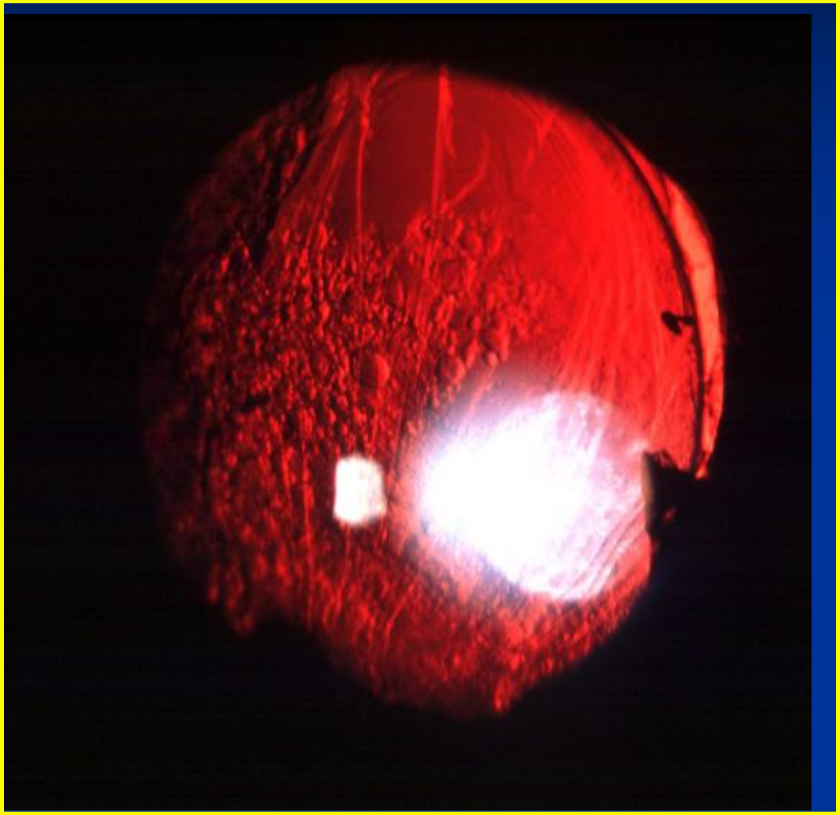
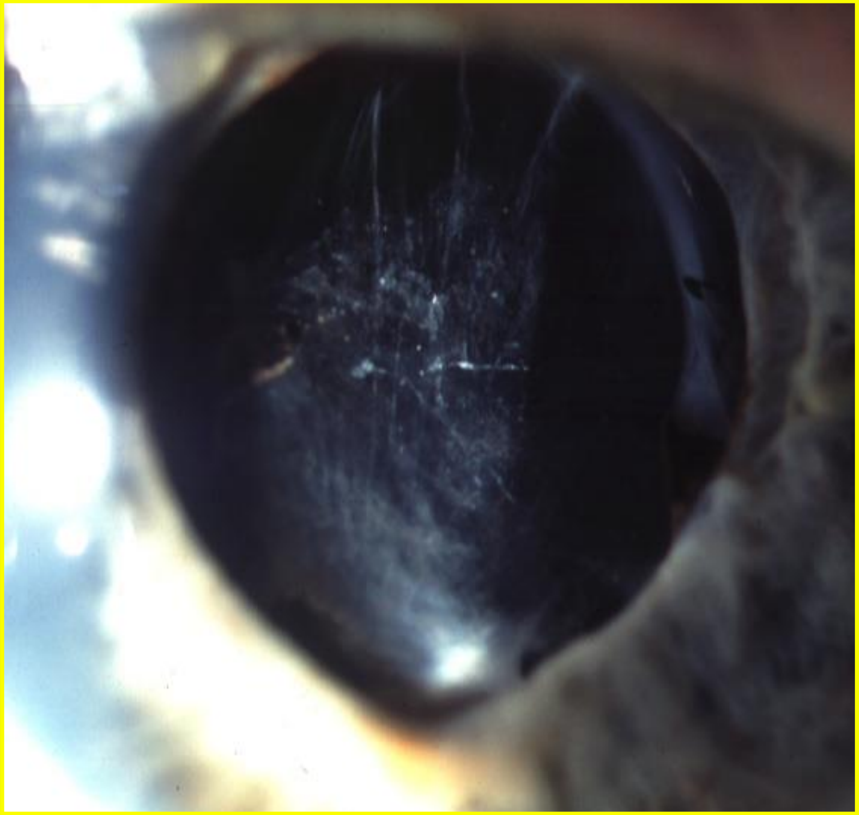
Cause

- Usually inadequate suturing of incision
- Most frequently follows inappropriate management of vitreous loss

Treatment

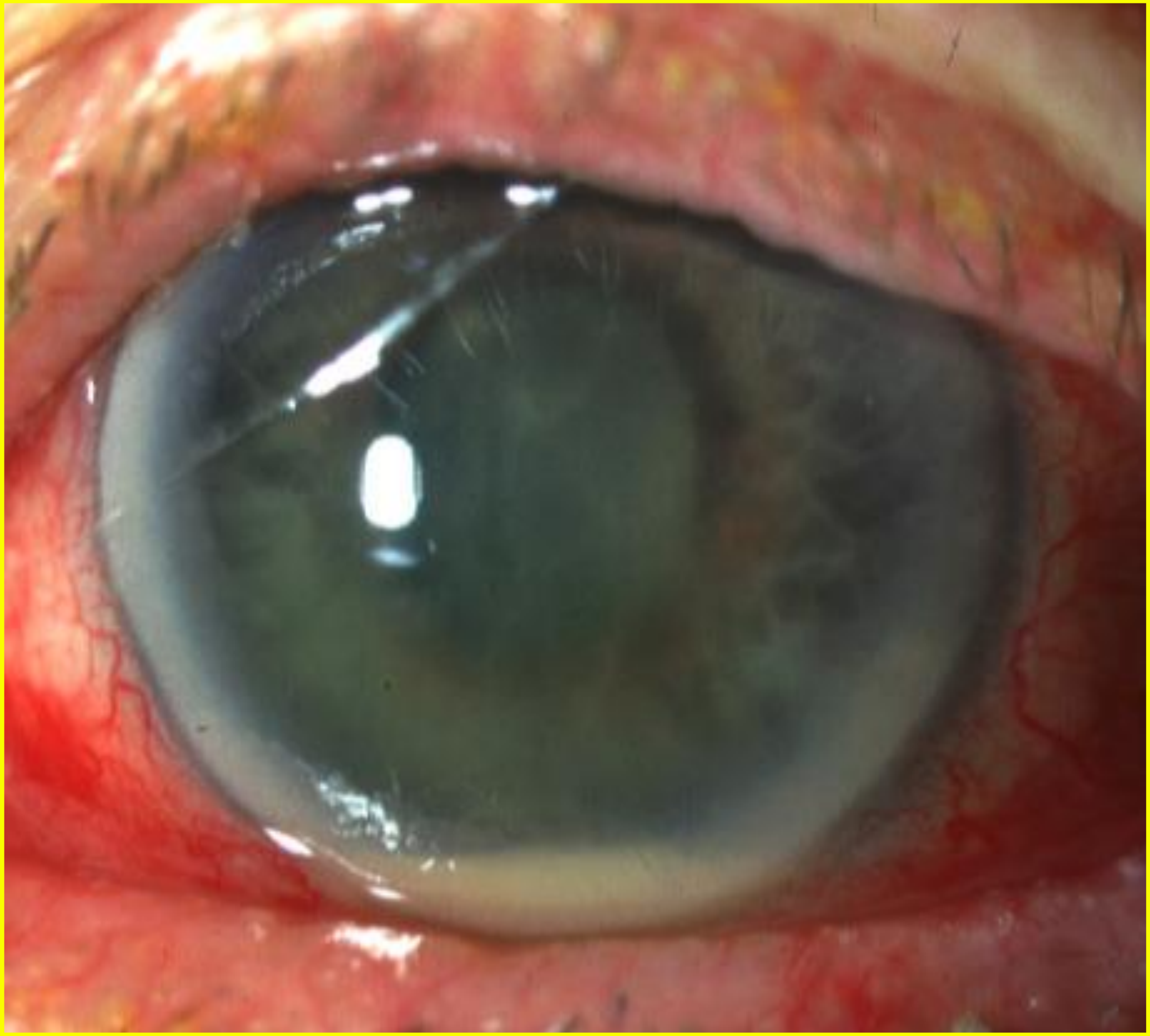
- Excise prolapsed iris tissue
- Resuture incision

Capsular Opacification

	
• Proliferation of lens epithelium • Occurs after 3-5 years	

Acute bacterial endophthalmitis

Incidence - about 1:1,000



Common causative organisms

- *Staph. epidermidis*
- *Staph. aureus*
- *Pseudomonas* sp.

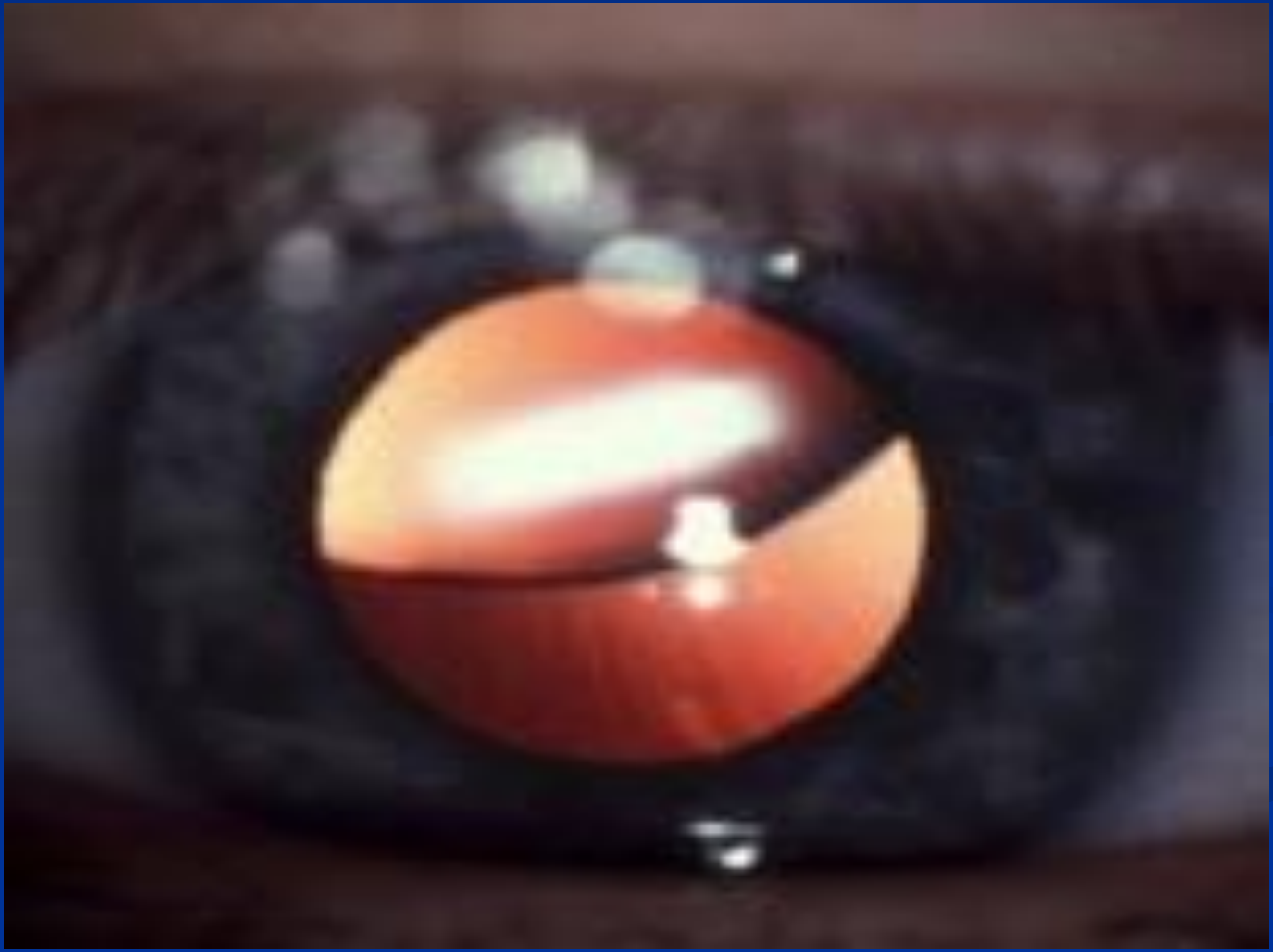
Source of infection

- Patient’s own external bacterial flora is most frequent culprit
- Contaminated solutions and instruments
- Environmental flora includin that of surgeon and operating room personnel

ECTOPIA LENTIS

1. **Acquired**
2. **Isolated familial ectopia lentis**
3. **Associated with systemic syndromes**
   - **Marfan syndrome**
   - **Weill-Marchesani syndrome**
   - **Homocystinuria**
4. **Treatment options**

Sublaxated Lens (Ectopia Lentis)



Uveal Tract

Uveal Tract

- Is the intermediate coat of the eyeball

Anterior Uvea

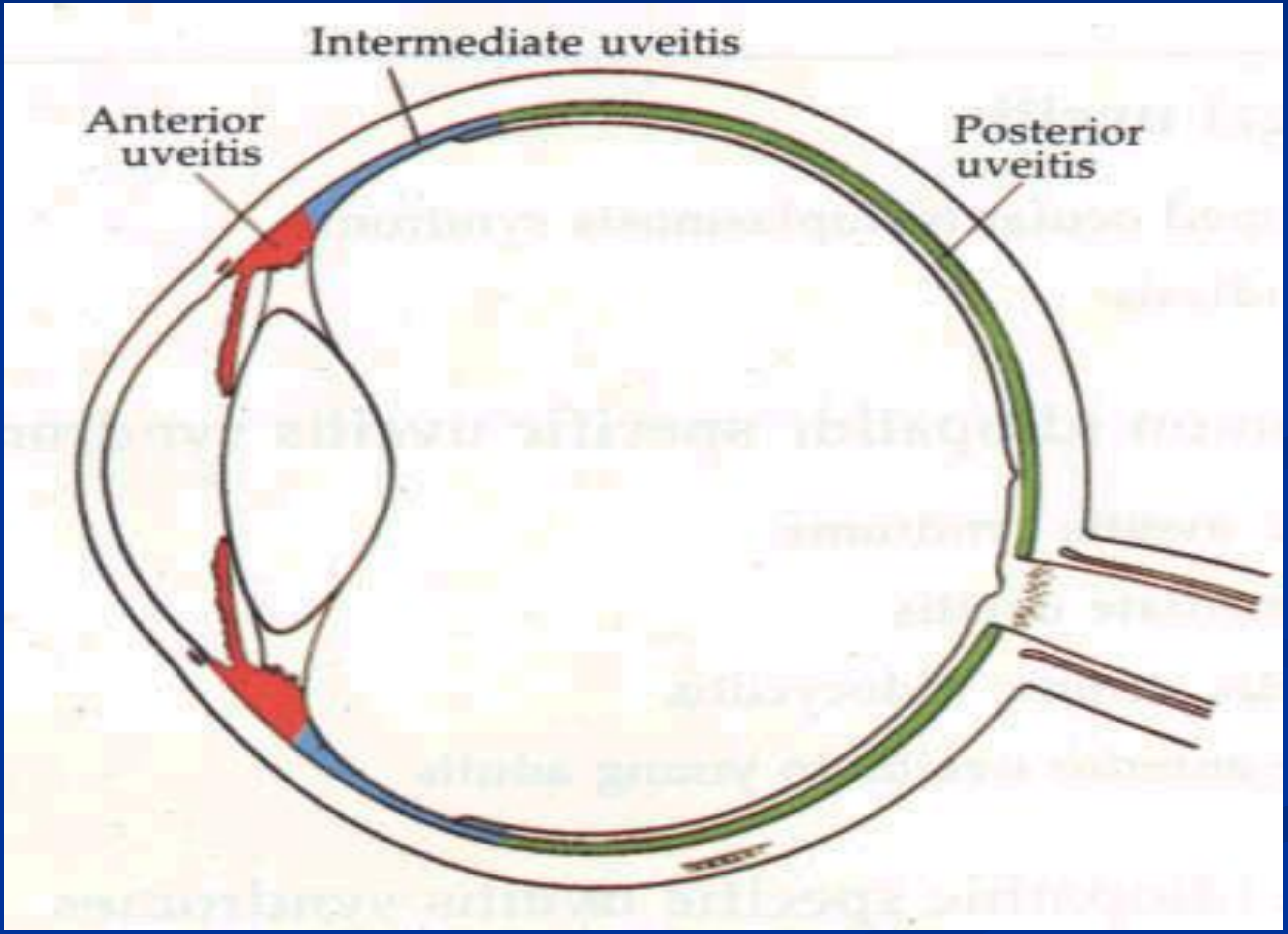
- Consists of : Iris

  Ciliary Body

  Choroid

Posterior Uvea

Anatomical classification of uveitis


Intermediate uveitis
Anterior uveitis
Posterior uveitis

Inflammations of the Iris and Ciliary Body (Anterior uveitis)

- Aetiology
  - Secondary Irido-cyclitis
    - Corneal ulcer Retinal detachment
    - Scleritis Intra-ocular FB
    - Intra-ocular tumor Lens-induced
  - Primary Irido-cyclitis
    - Exogenous
    - Endogenous

Symptoms

- Pain
- Photophobia
- Lacrimation
- Decreased vision
    - Haziness of Aqueous and vitreous
    - Oedema of cornea
    - Spasm of CB - Myopia
    - Macular Oedema
    - Secondary Glaucoma

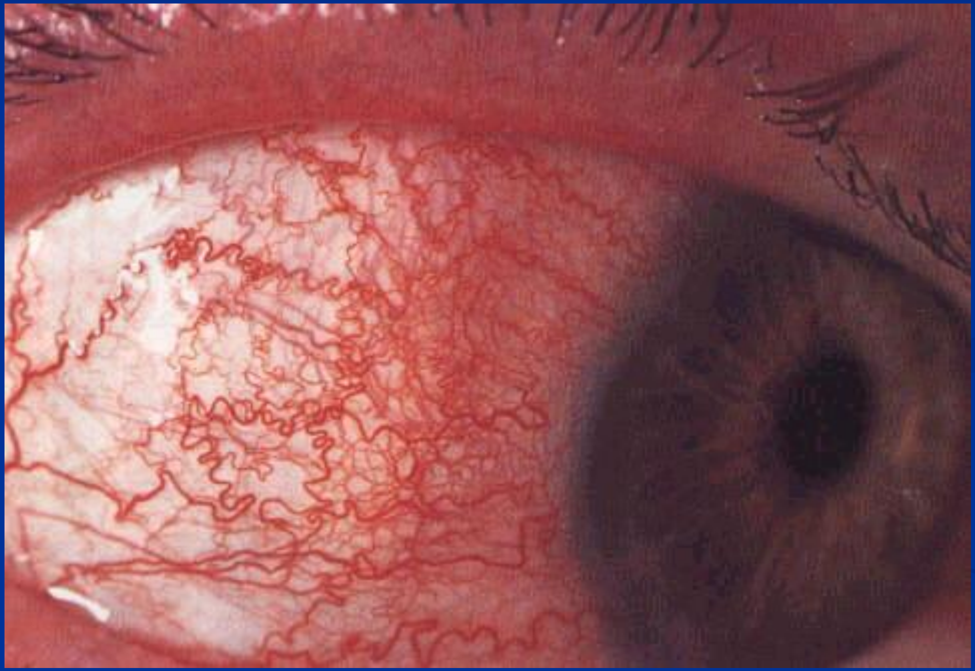
Signs

- Lids *Edematous*
- Conjunctiva *Ciliary injection*
- Cornea *KPs*
- AC *Aqueous Flare*

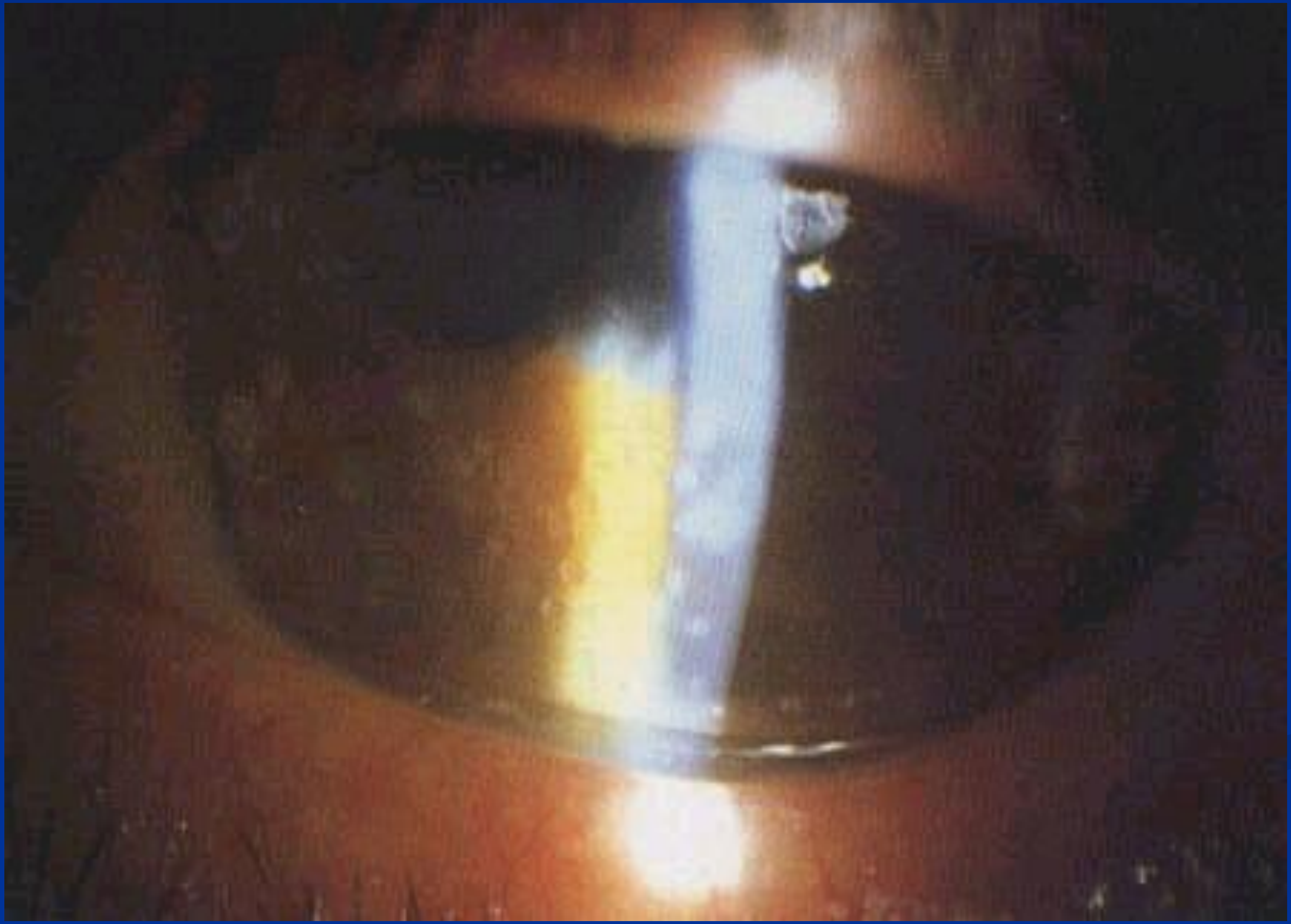
  Aqueous Cells

  Hypopyon *Hyphaema*
- Iris changes *Muddy*
- Pupil *Constricted and irregular; Synechia*
- Ciliary Body *Spasm*

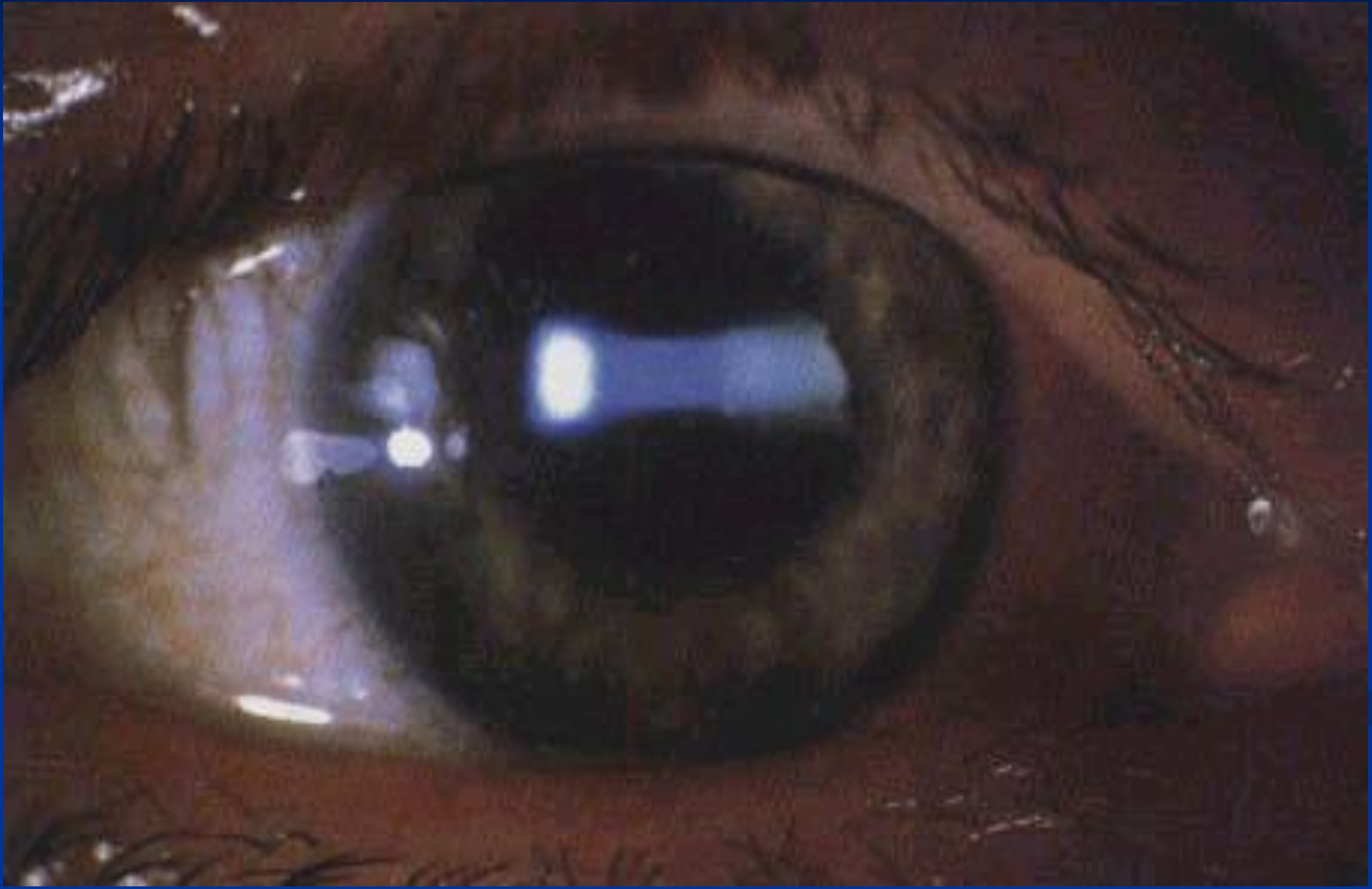
Ciliary injection in acute anterior uveitis



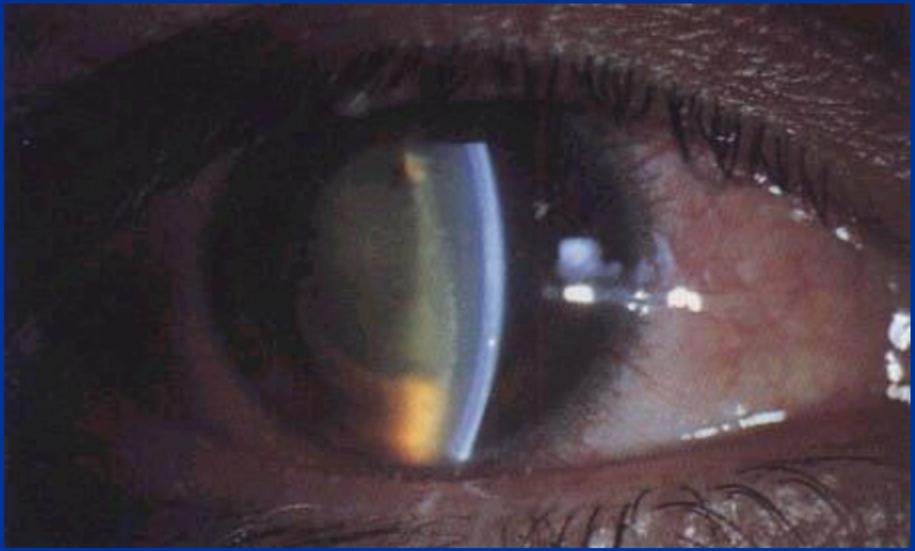
Old Keratic Precipitates (KPs)



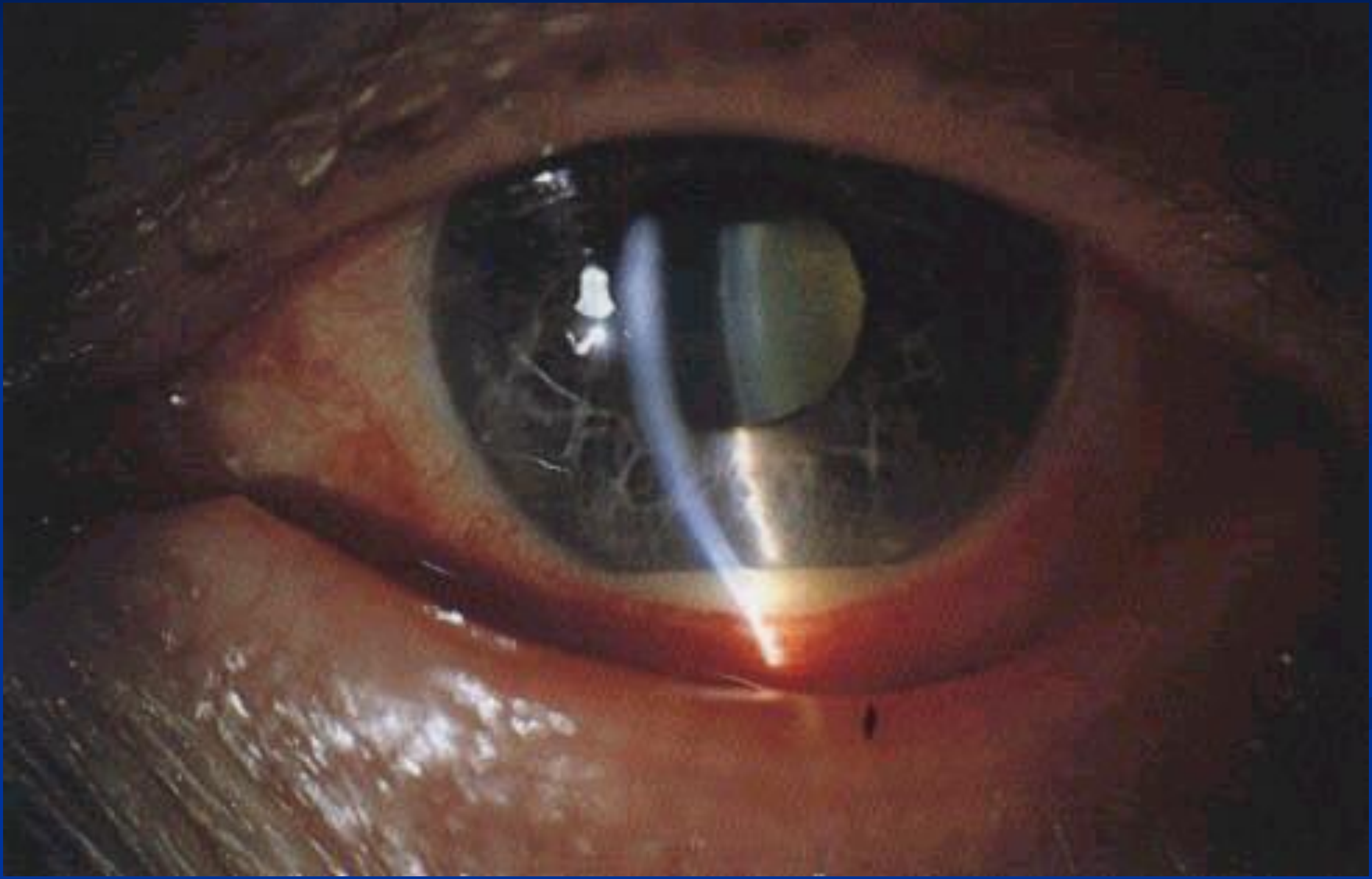
Aqueous cells and dense flare



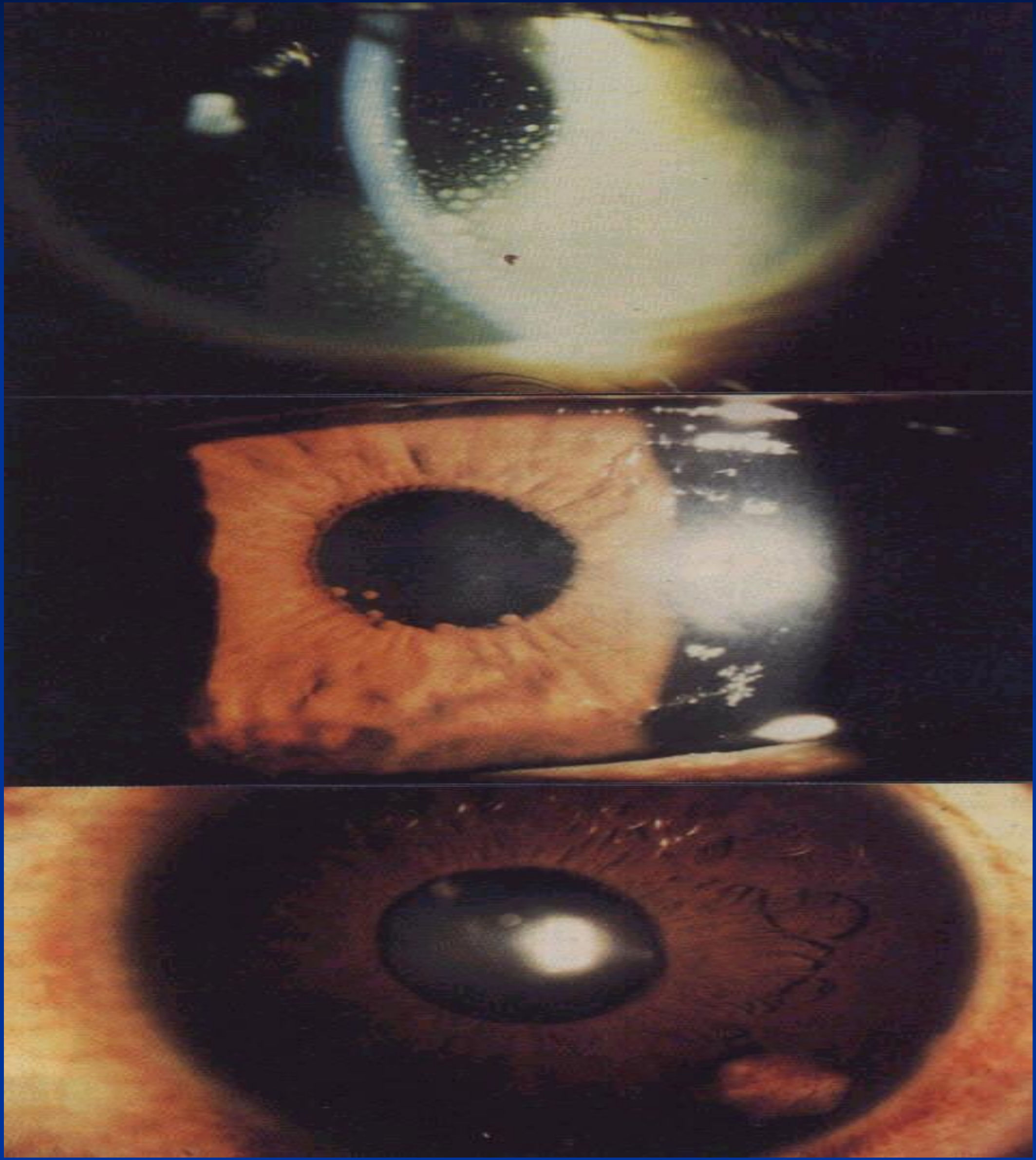
Very severe acute anterior uveitis with fibrinous aqueous exudate



Hypopyon in Anterior Uveitis



Granulomatous anterior uveitis

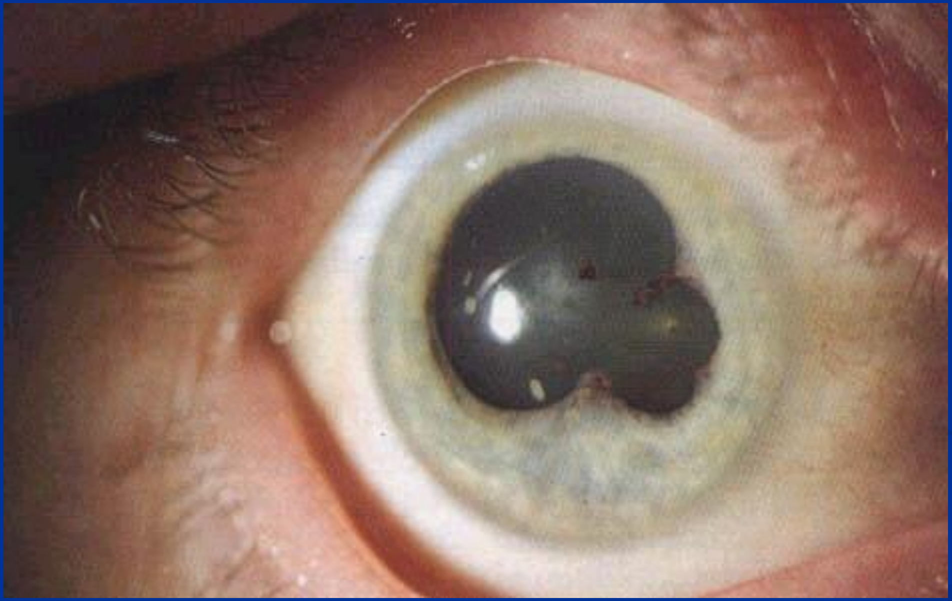


Mutton Fat KPs

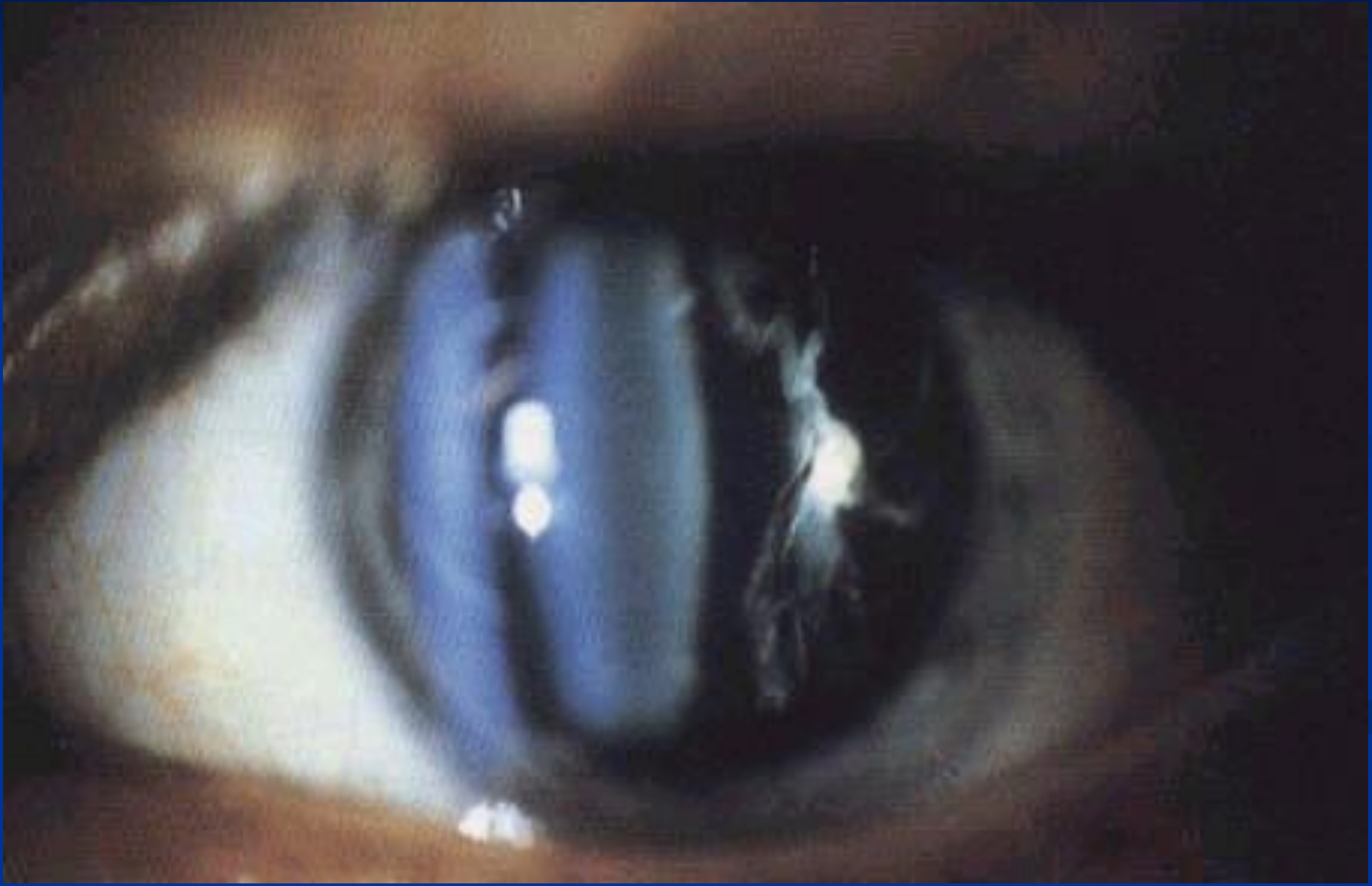
Koeppe nodules

Busacca nodule

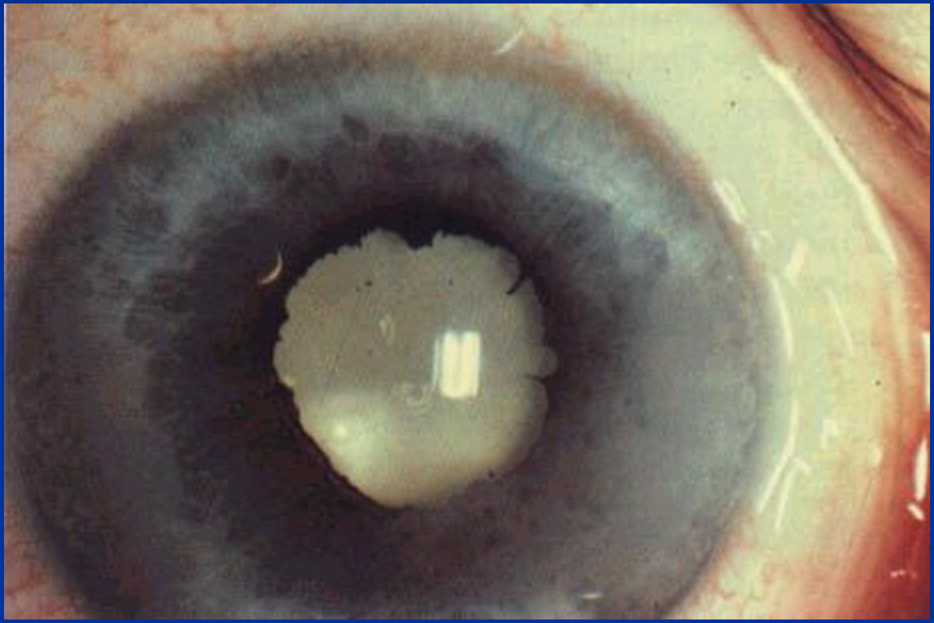
Posterior Synechiae following attack of acute anterior uveitis



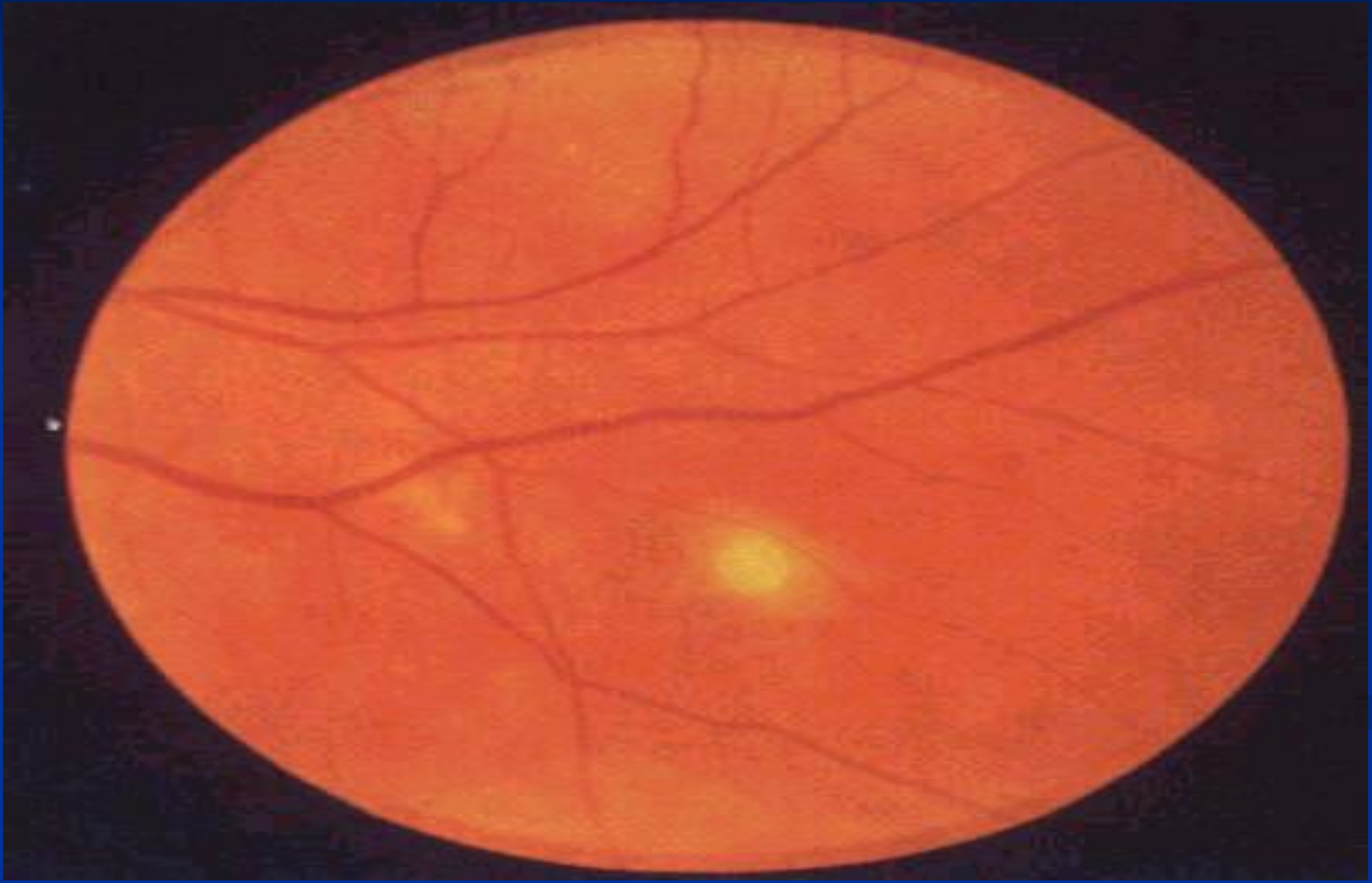
'Snowball' vitreous opacities in pars planitis



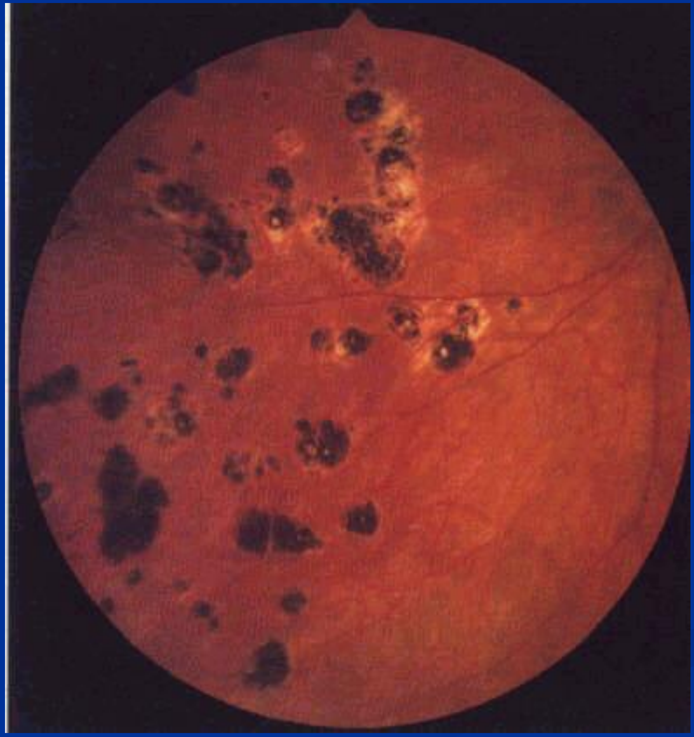
Band keratopathy and mature secondary cataract chronic iridocyclitis



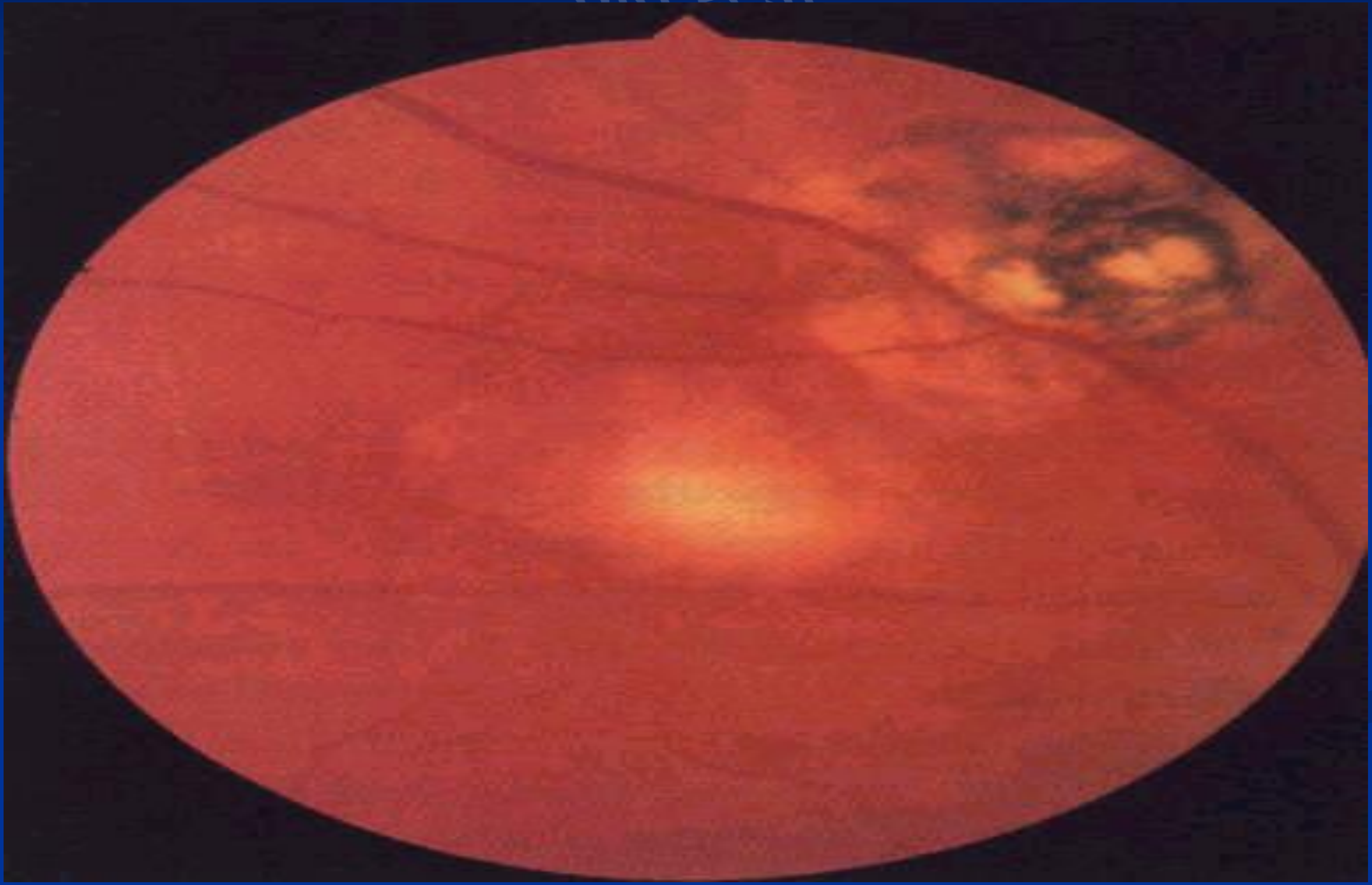
Active focal Choroiditis



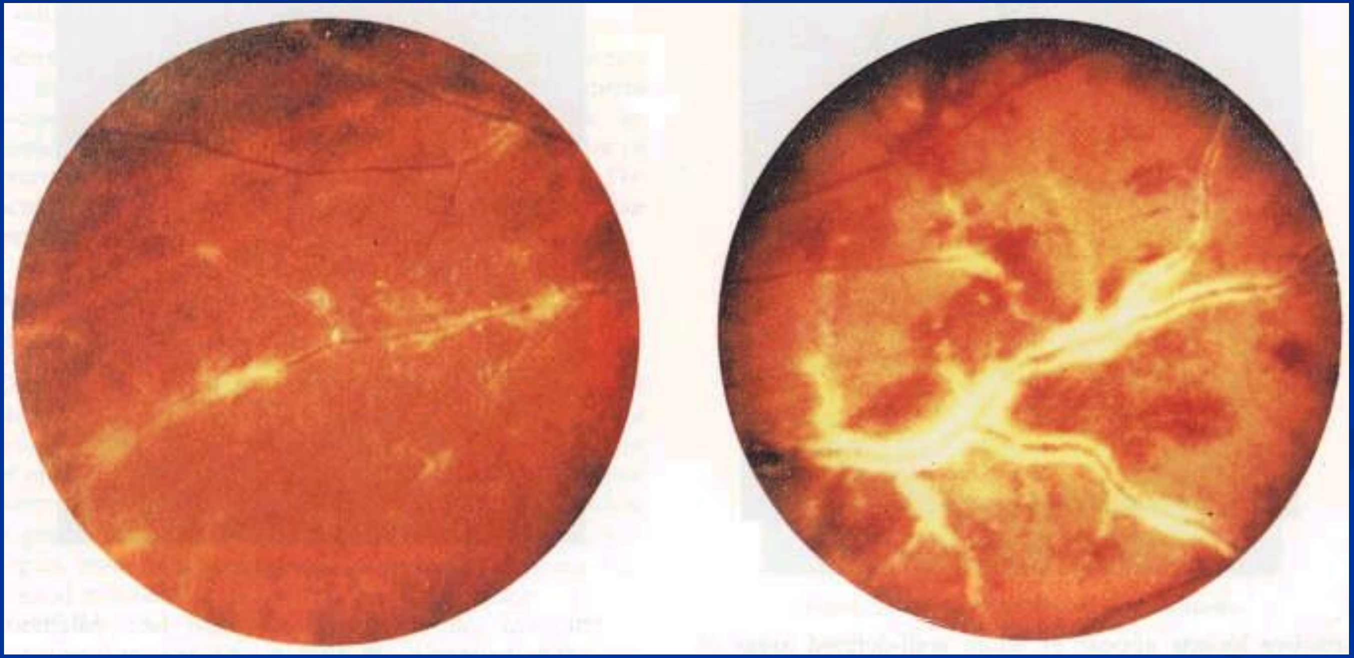
Old multifocal choroiditis



Active focal toxoplasma retinitis near old scar

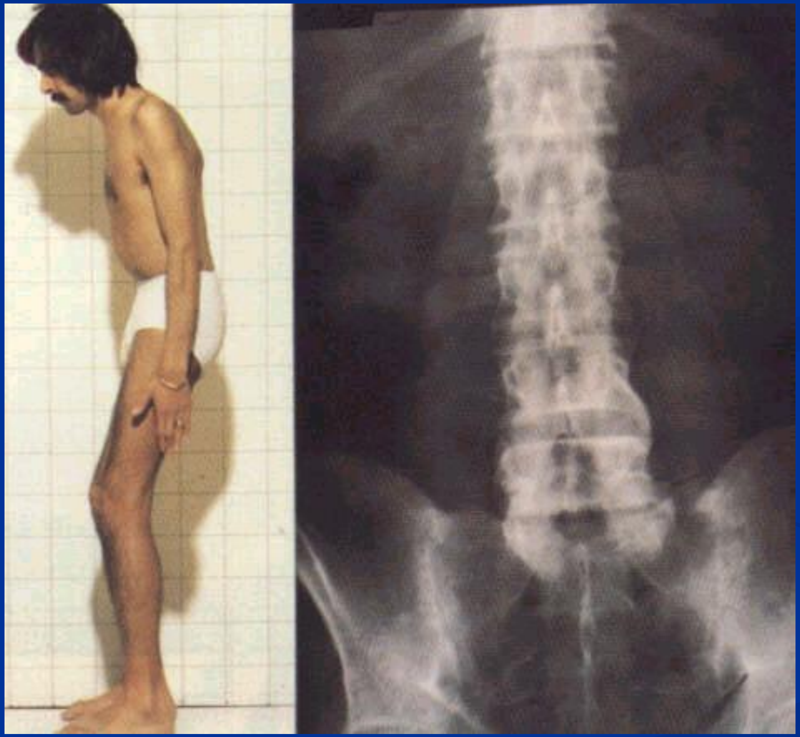


Active retinal periphlebitis
(early involvement and severe involvement)

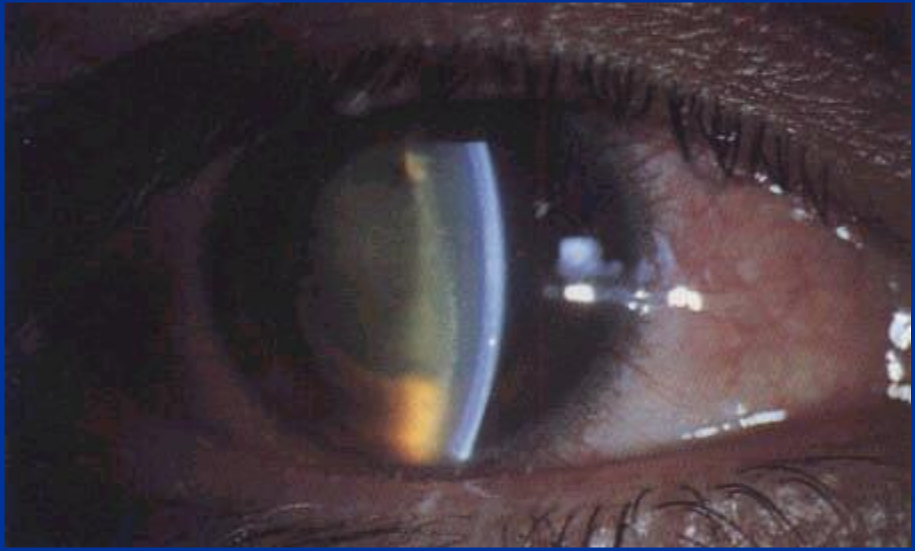


Advanced Ankylosing Spondylitis. *Left:*

(fixed flexion deformity; radiographic changes showing bilateral sclerosis and erosion of sacroiliac joints and bony fusion of spine

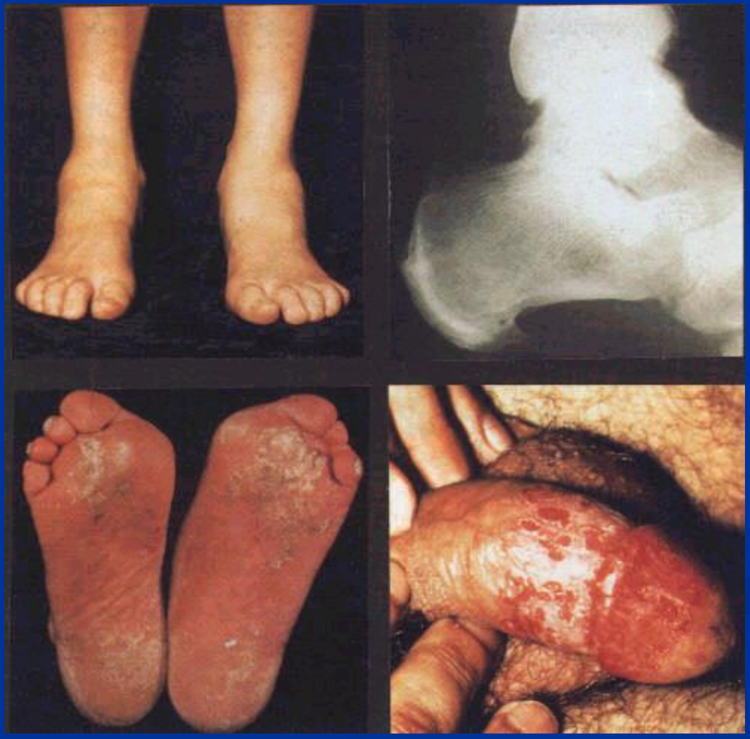


Very severe acute anterior uveitis with fibrinous aqueous exudate in ankylosing spondylitis

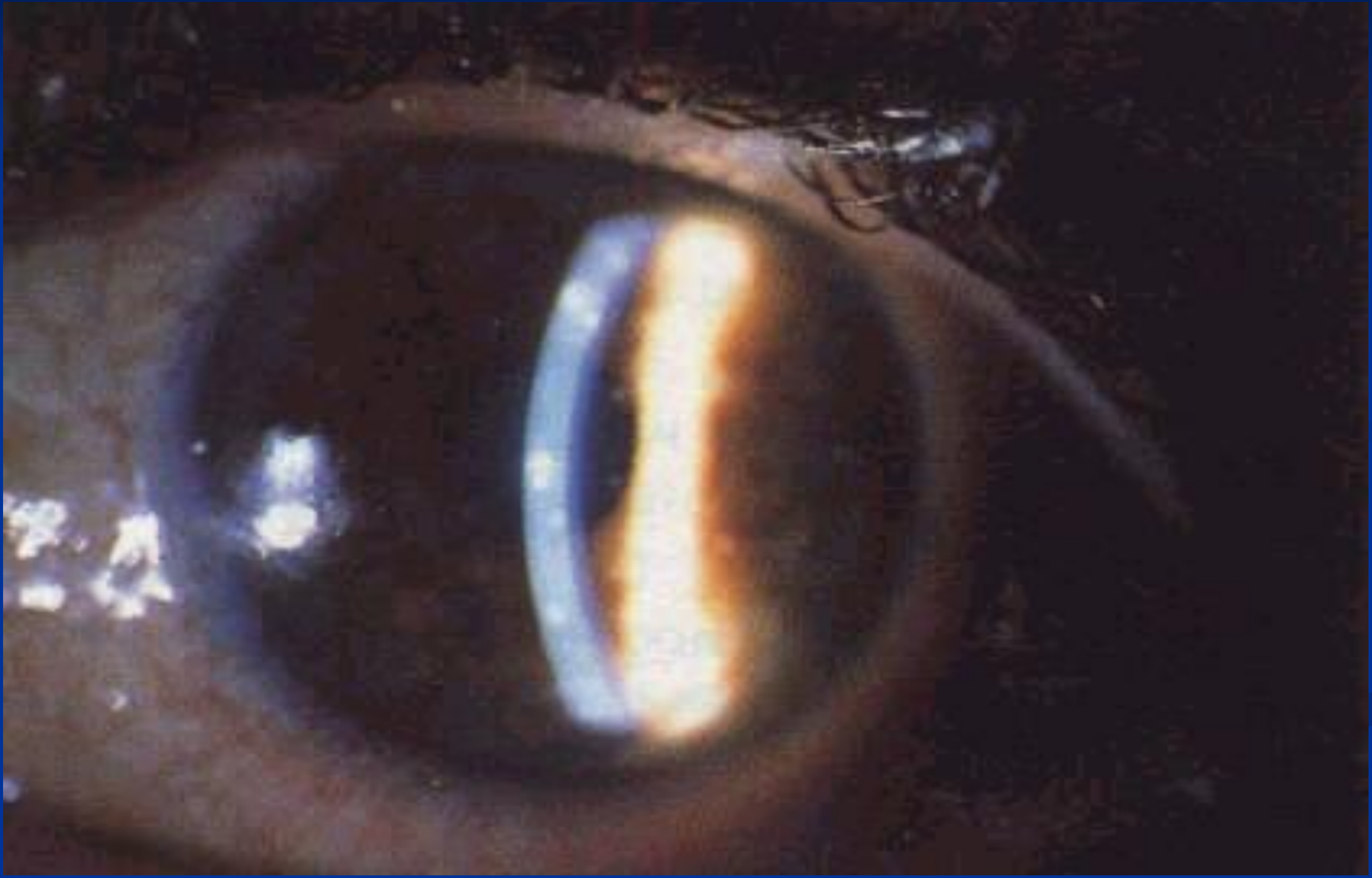


Reiter's disease

(acute arthritis of ankles; radiograph showing calcaneal spur; keratoderma blenorrhagica; circinate balanitis)

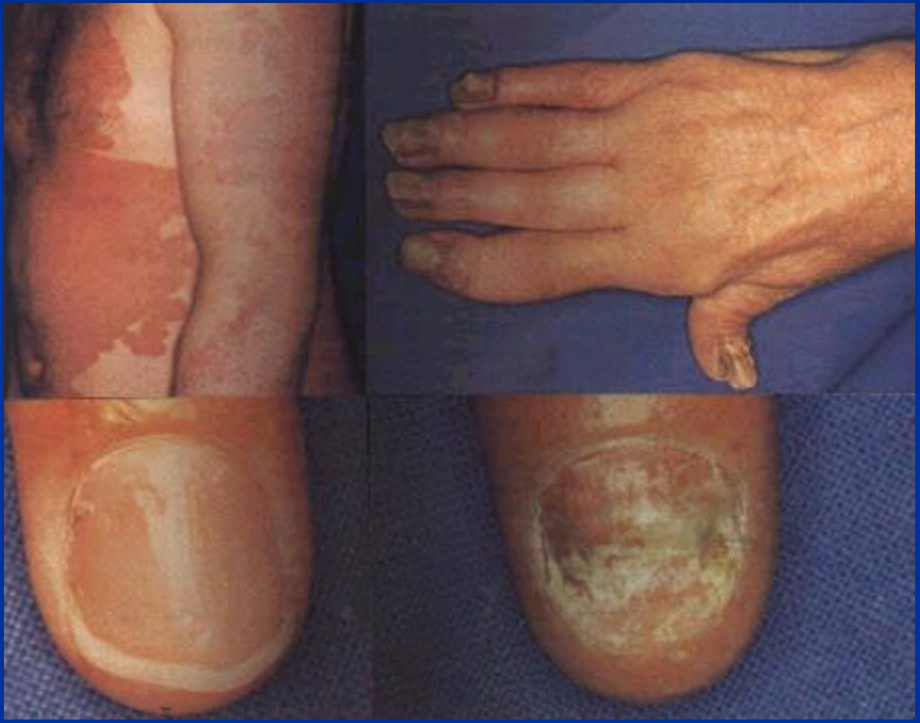


Subepithelial corneal opacities in Reiter's keratitis



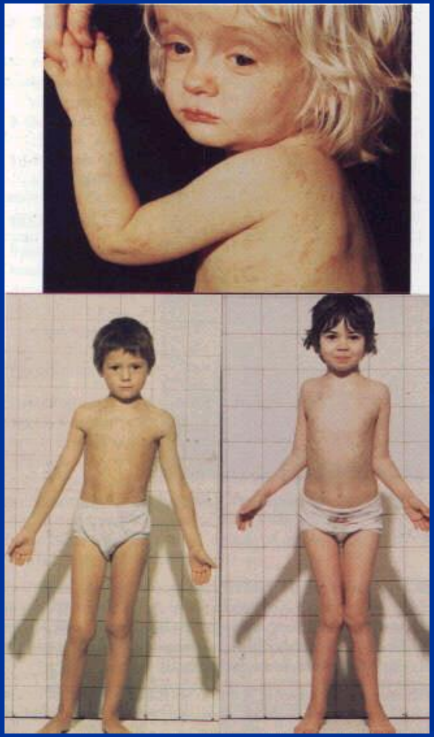
Psoriatic arthritis.

(severe psoriasis; sausage shaped fingers and severe nail dystrophy; nail pitting; onycholysis)

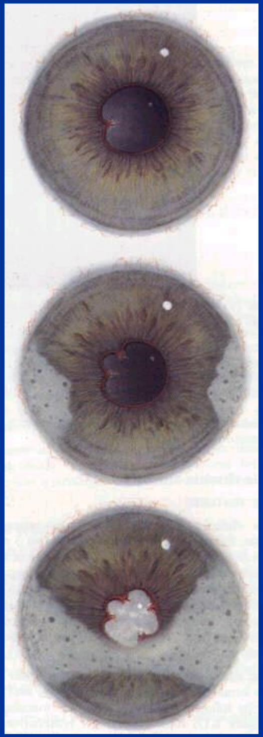


Juvenile chronic arthritis

(Maculopapular rash in systemic onset disease; pauciarticular involvement of right knee: polyarticular disease)

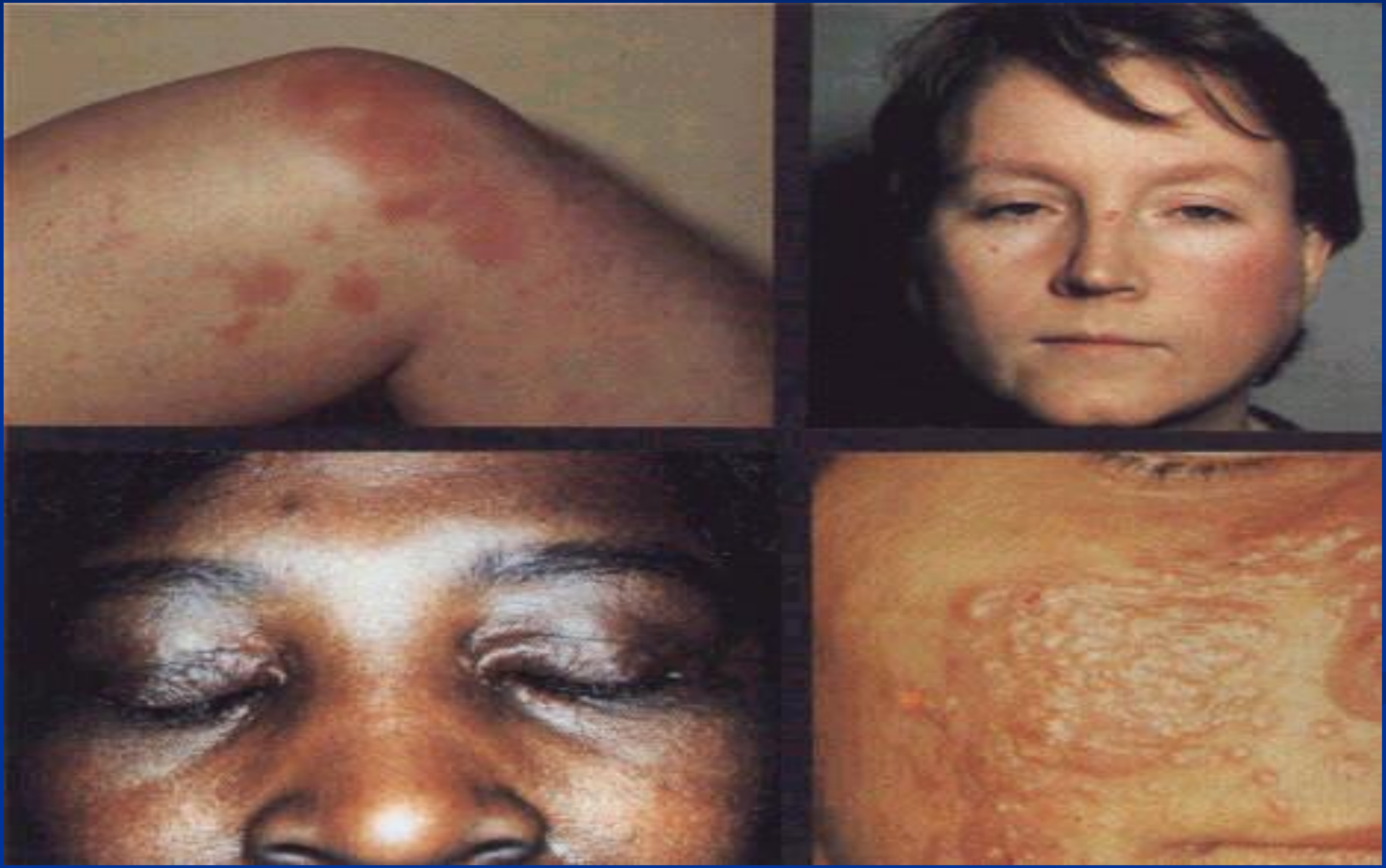


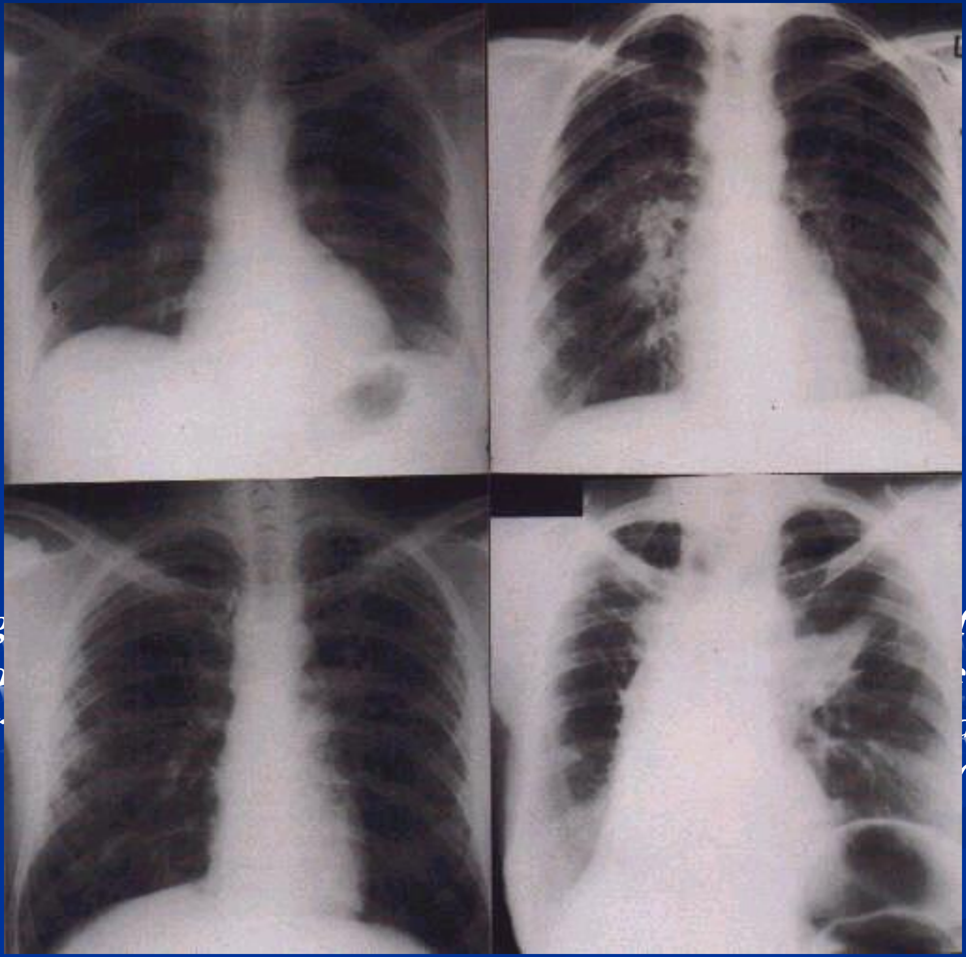
Progression of complications of chronic anterior uveitis associated with juvenile chronic arthritis (a) Posterior synechiae formation; (b) increase in number of posterior synechiae and early band keratopathy; (c) extensive band keratopathy and mature cataract



Sarcoidosis

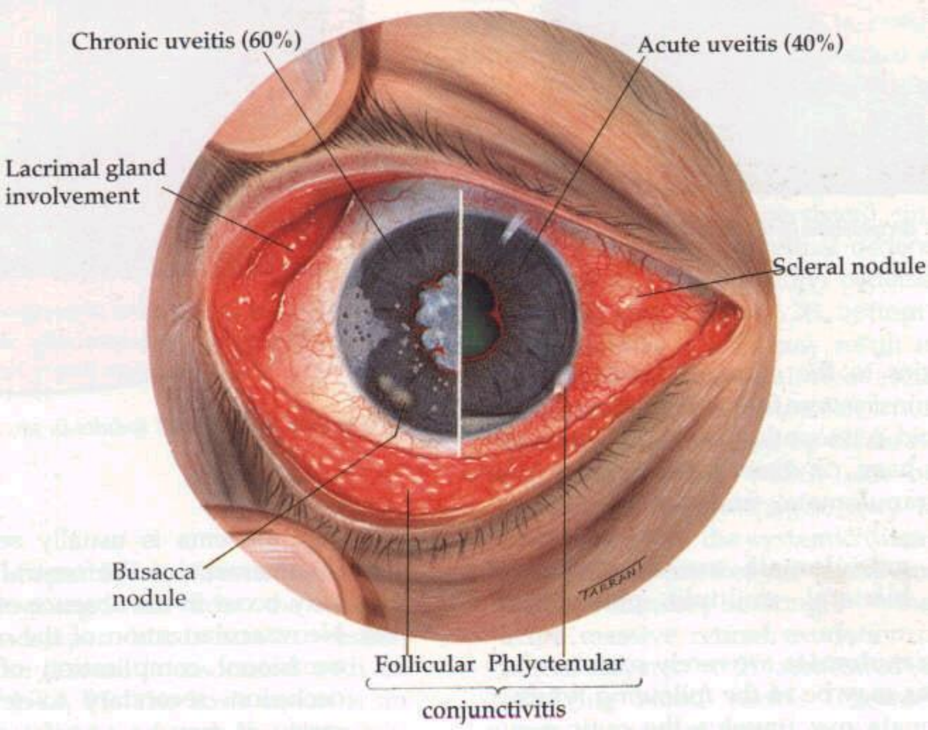
(erythema nodosum; parotid enlargement; eyelid infiltration; cheek infiltration)



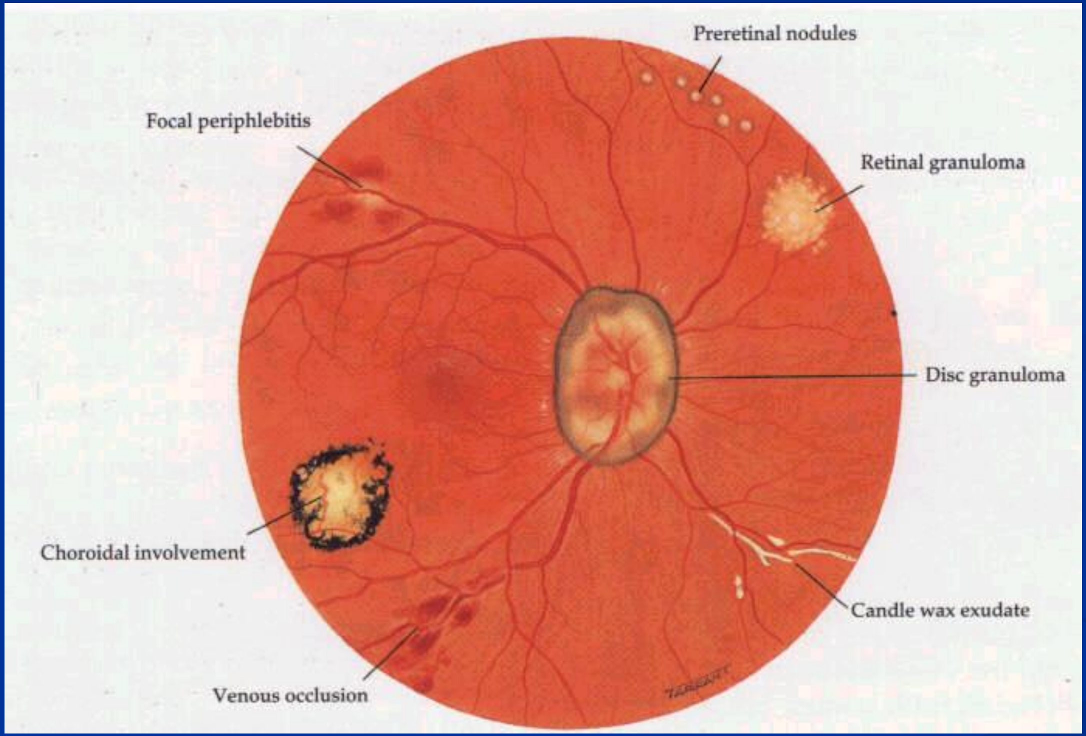


Stag ft: bilateral hilar
ad ticulonodular
par dular infiltrates
(stage 4)

Anterior segment complications of sarcoidosis

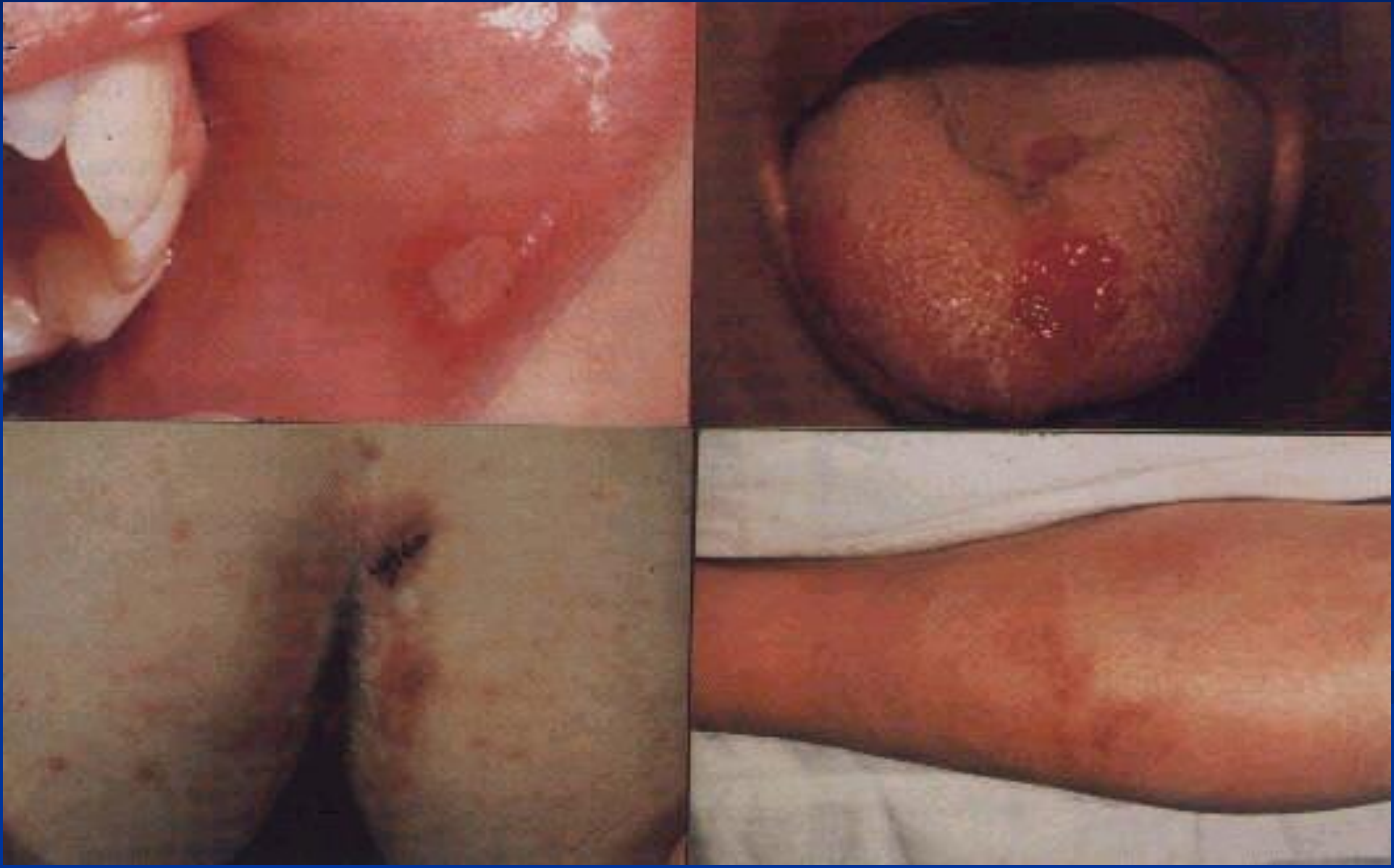

Chronic uveitis (60%)
Acute uveitis (40%)
Lacrimal gland involvement
Scleral nodule
Busacca nodule
TARRANT
Follicular
Phlyctenular
conjunctivitis

Posterior segment complications of Sarcoidosis

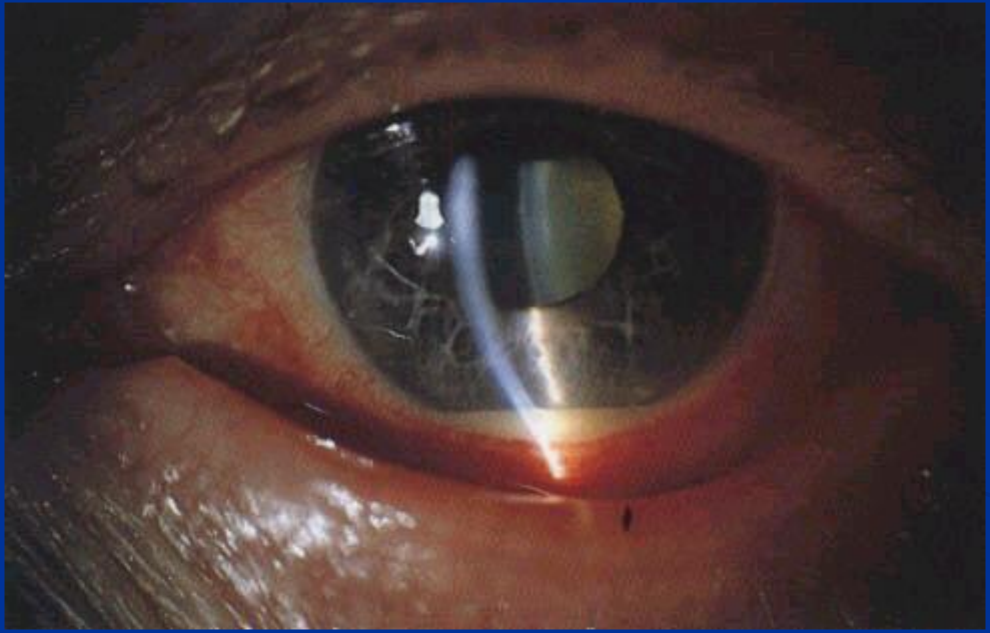

Preretinal nodules
Focal periphlebitis
Retinal granuloma
Disc granuloma
Choroidal involvement
Candle wax exudate
Venous occlusion

Behçet's disease

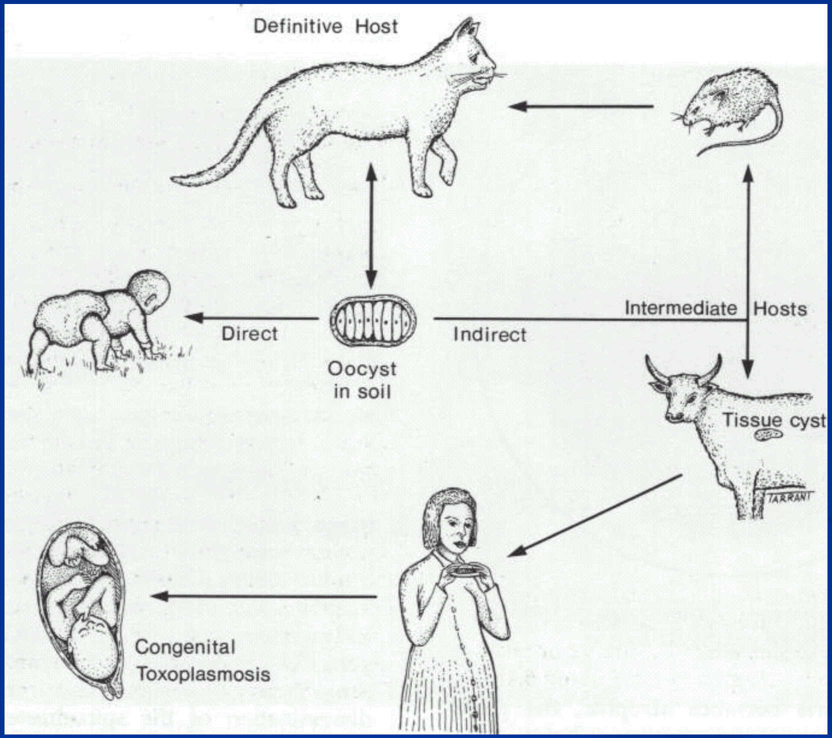
(ulcer of buccal mucosa; ulcer of tongue; genital ulceration; leg oedema secondary to severe thrombophlebitis)



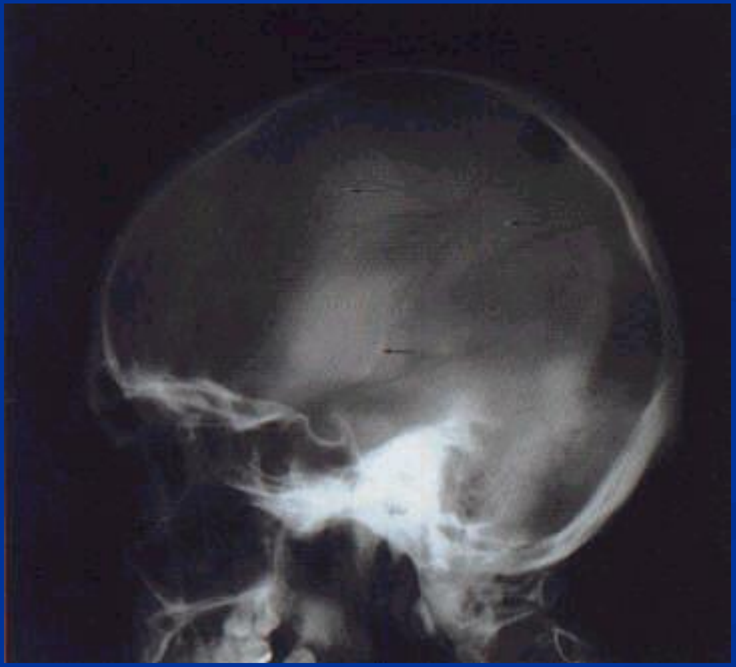
Hypopyon in anterior uveitis associated with Behçet's disease



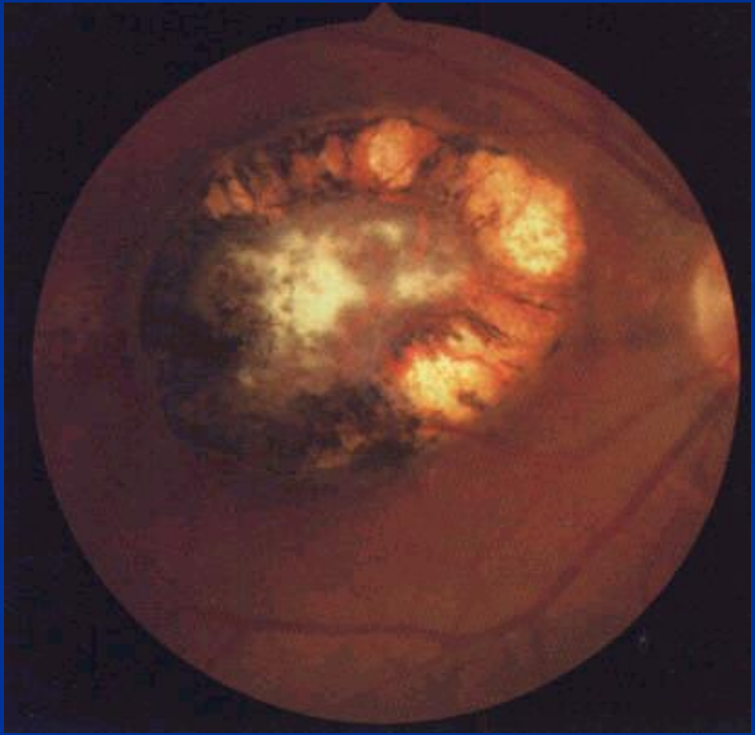
Life cycle of Toxoplasma gondii


Definitive Host
Direct
Oocyst
in soil
Indirect
Intermediate Hosts
Tissue cyst
TARRANT
Congenital
Toxoplasmosis

Intracranial calcification in congenital toxoplasmosis

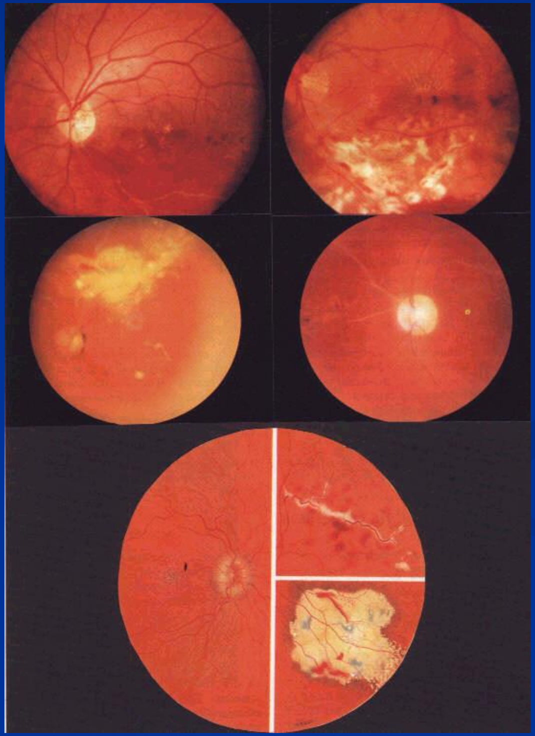


Macular scar in congenital toxoplasmosis

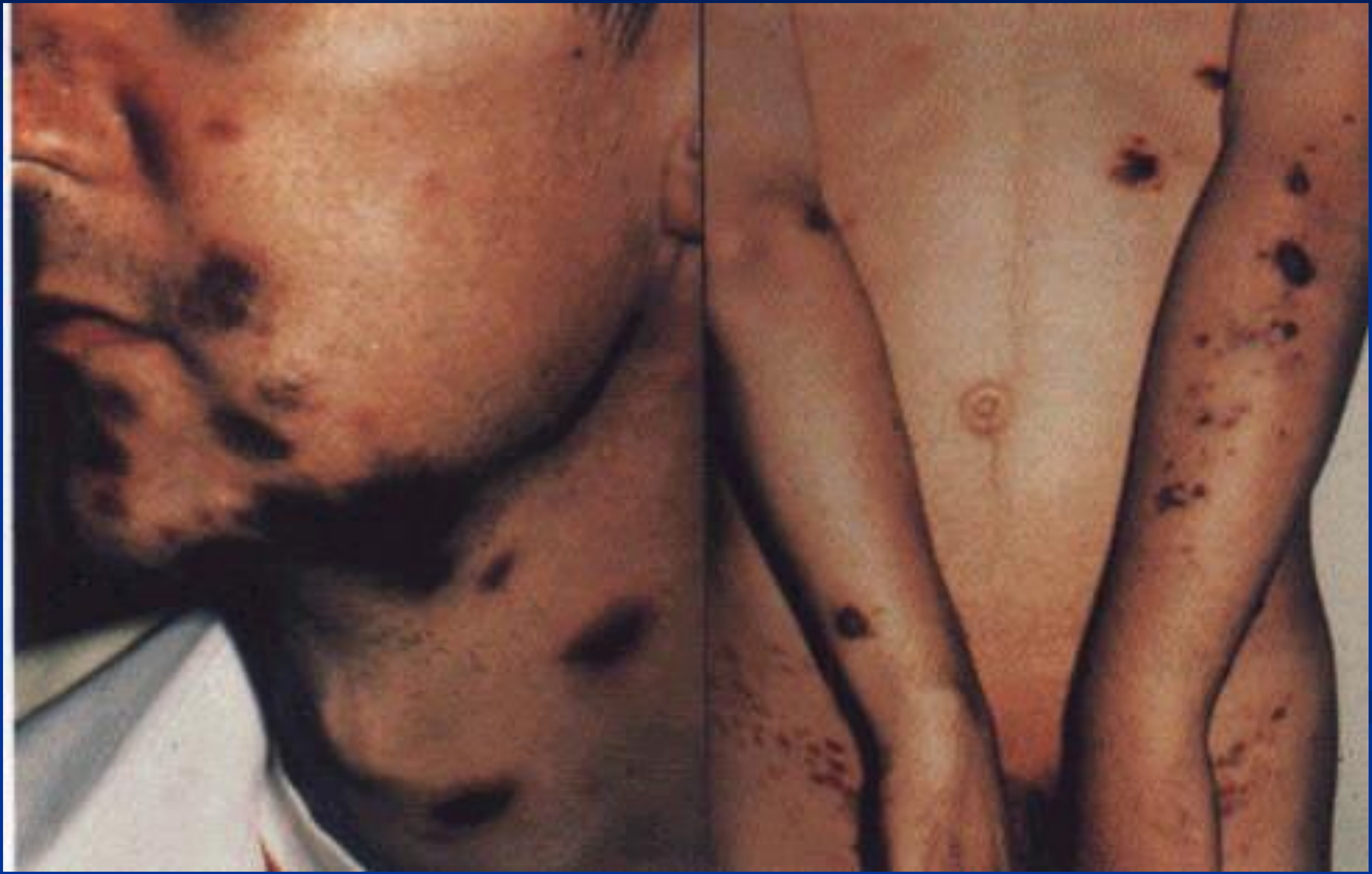


Posterior segment complications of Behçet's disease

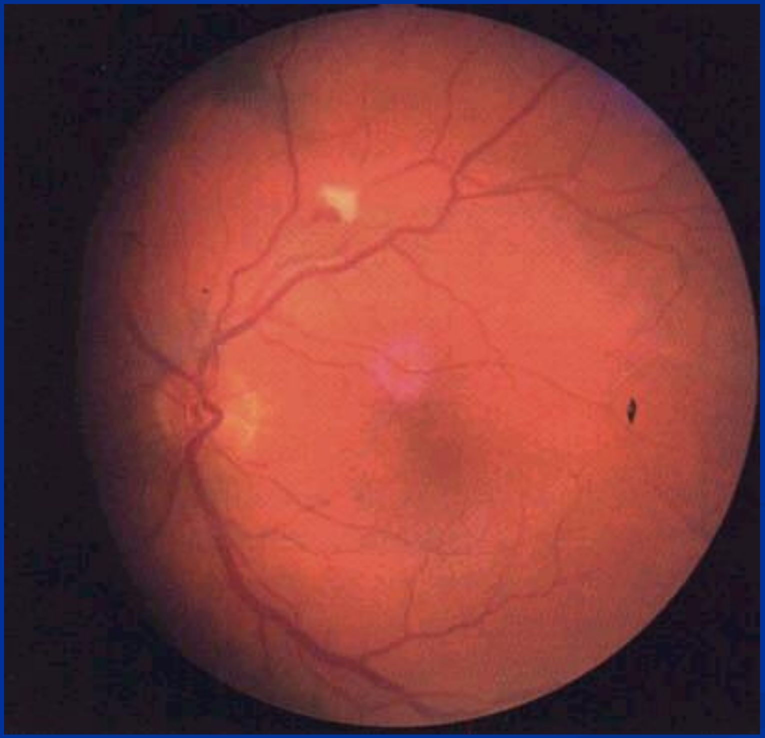
BRVO caused by periphlebitis; retinal infiltrates; massive retinal exudation; atrophy and vascular sheathing; composite of posterior segment manifestations)



Kaposi's sarcoma

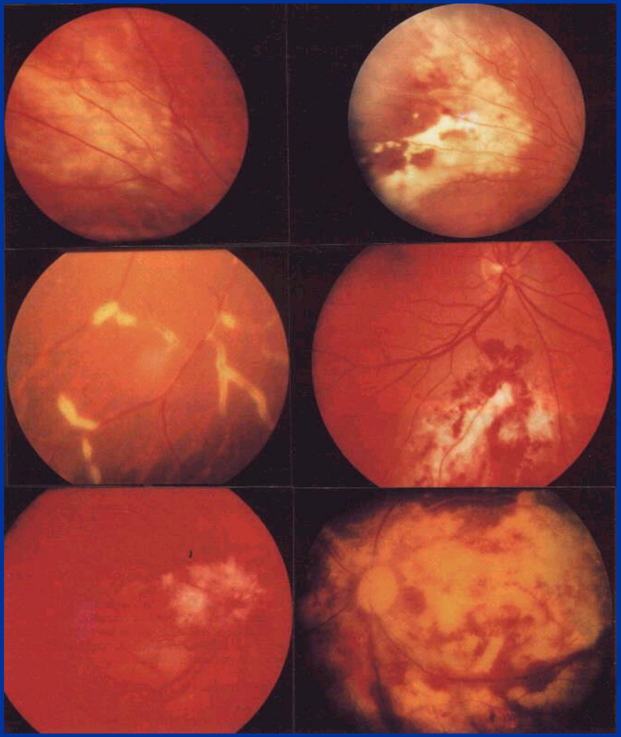


Retinal microangiopathy in AIDS

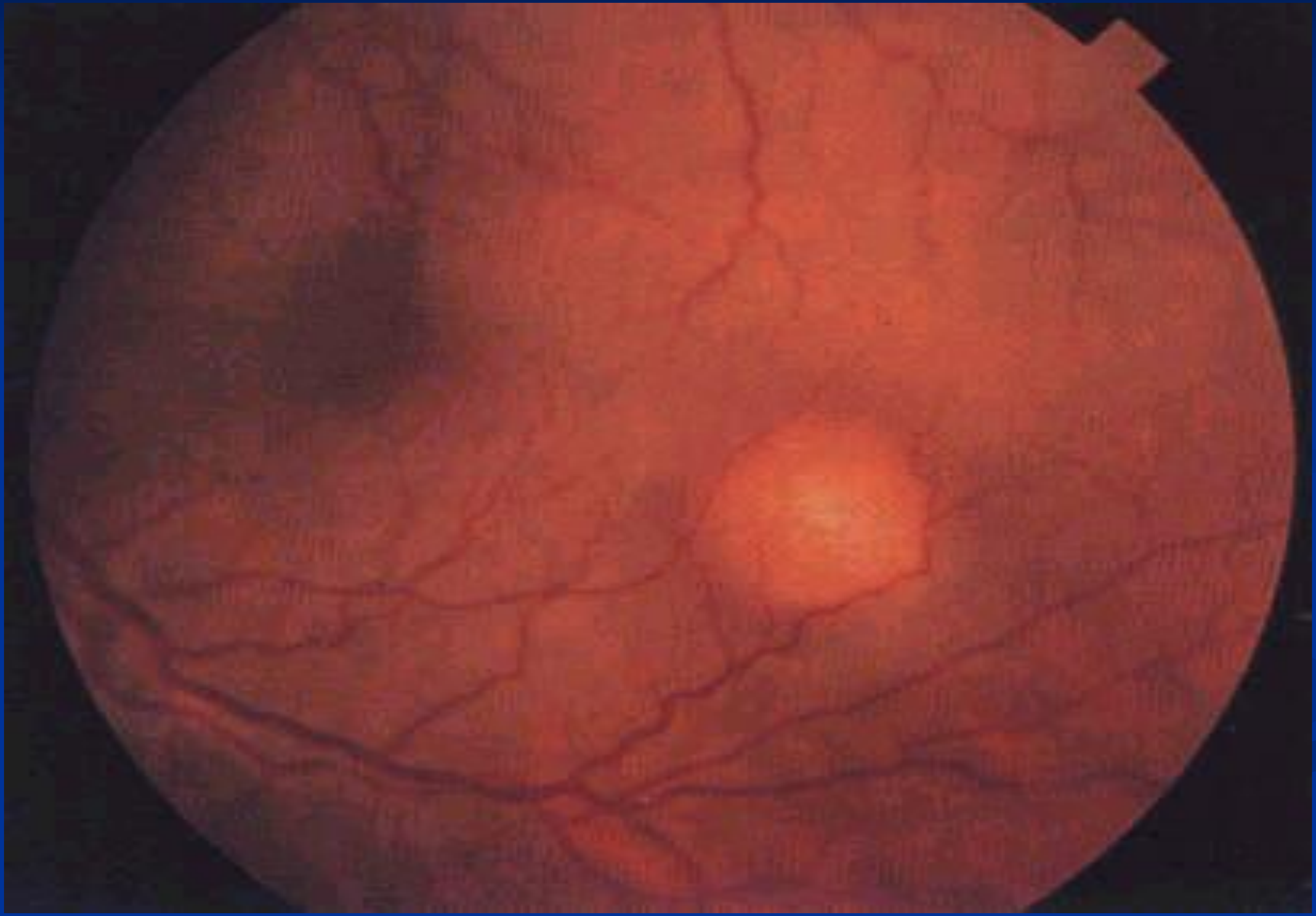


Cytomegalovirus retinitis in AIDS

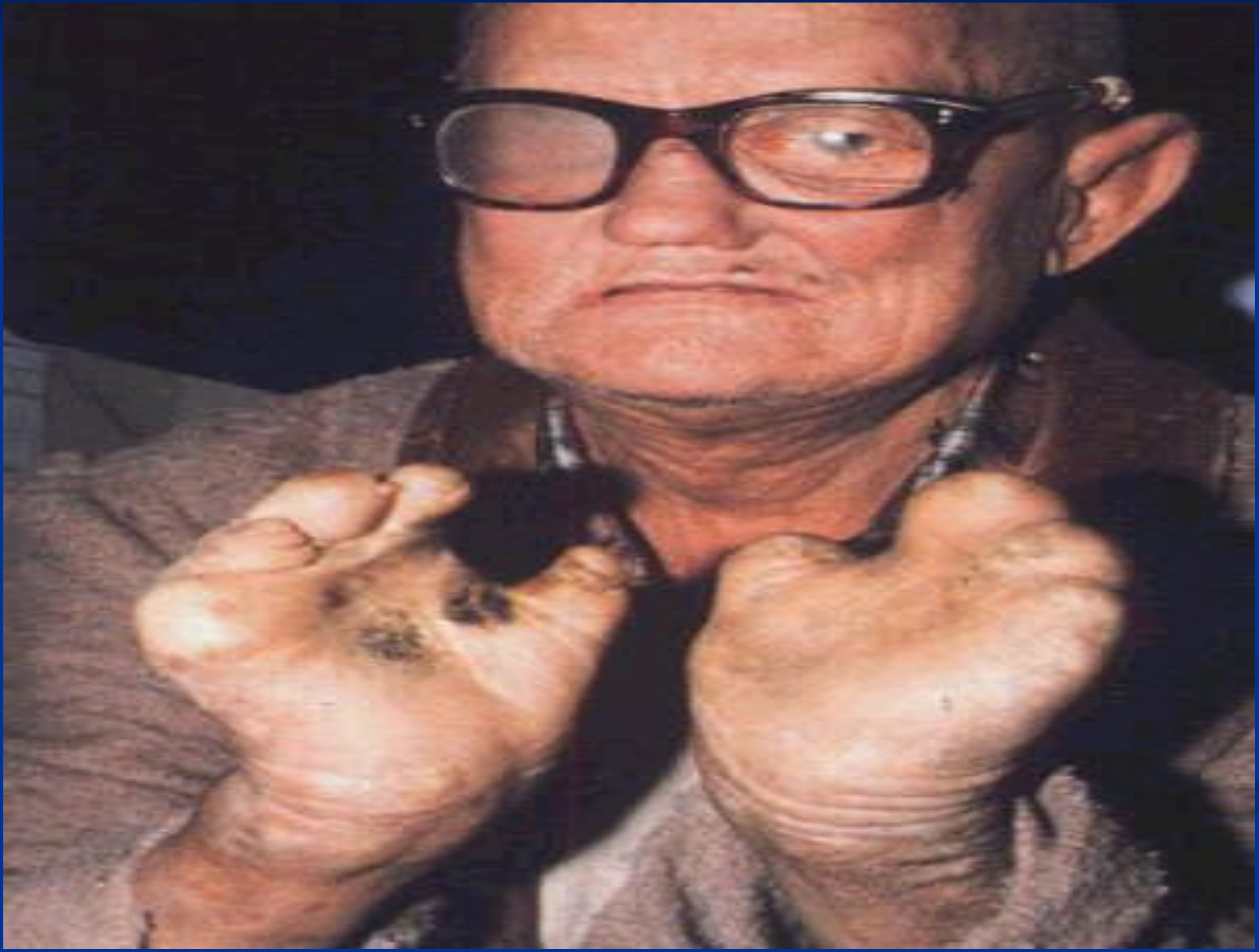
granular peripheral retinitis; central retinitis; venous sheathing; central retinitis with haemorrhage; optic nerve involvement; advanced stage



Solitary tuberculous choroidal granuloma

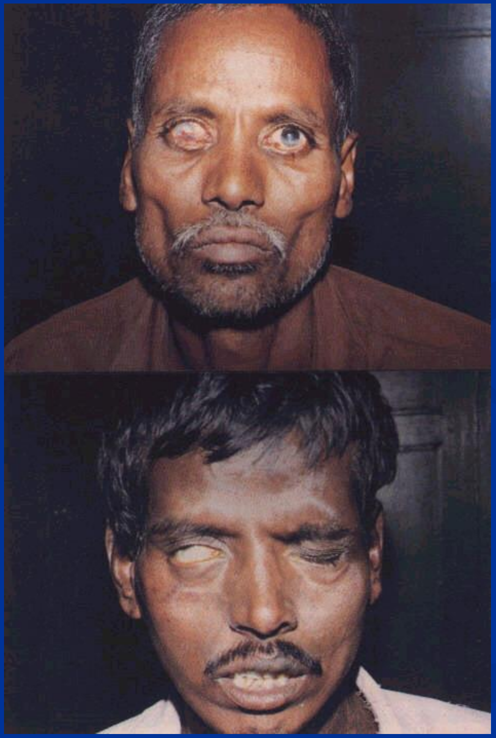


Advanced leprosy



Leprosy

severe corneal scarring; lagophthalmos



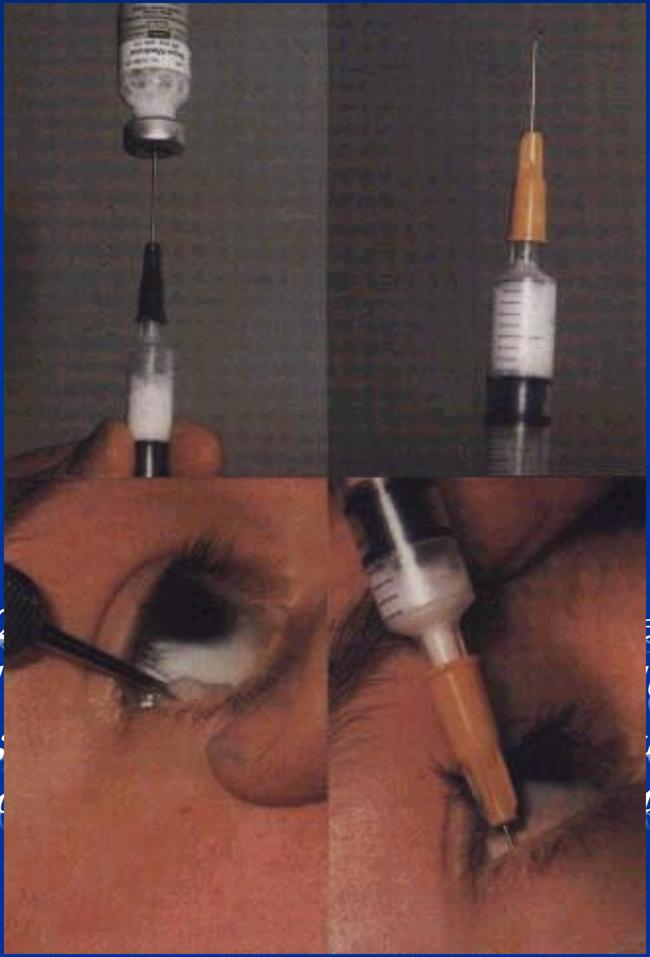
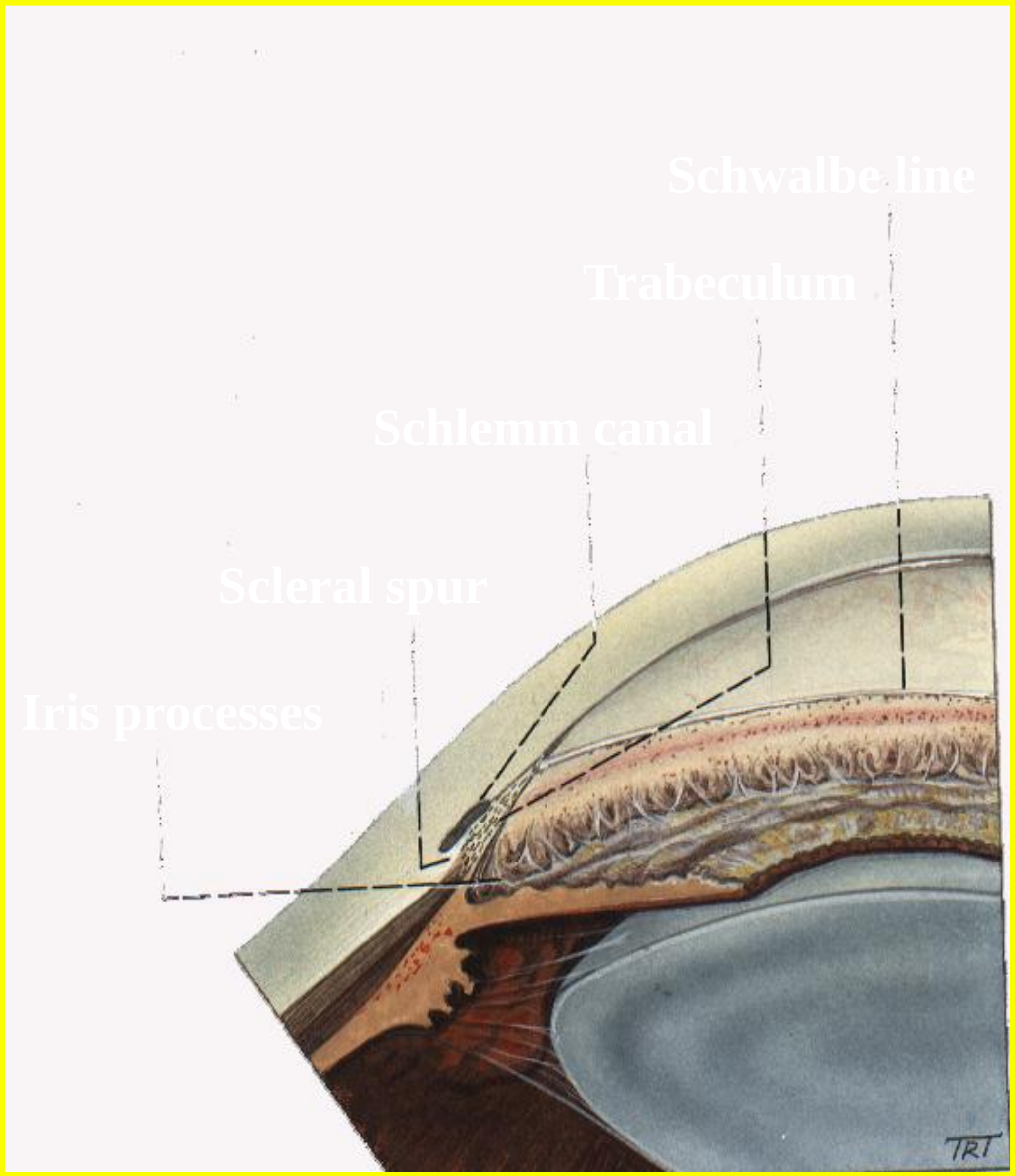


Figure 6.6 enon's injection. Top
left: steroid 6 mm needle used for
injection; hetized with cotton
pledget s ttom right: injection

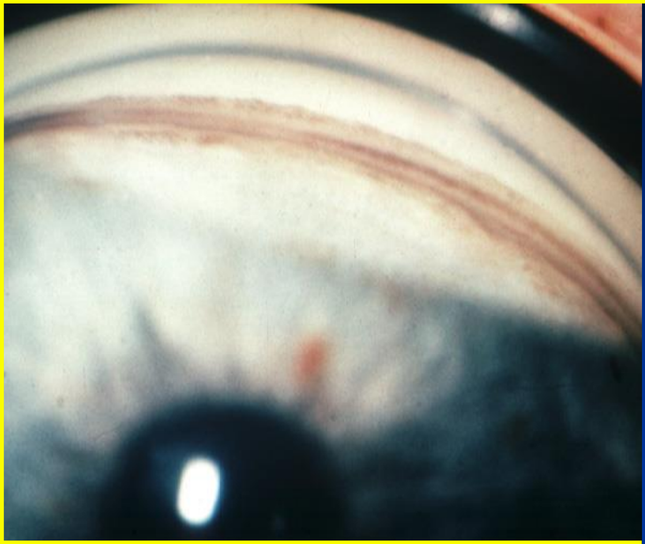
GLAUCOMA

Angle structures

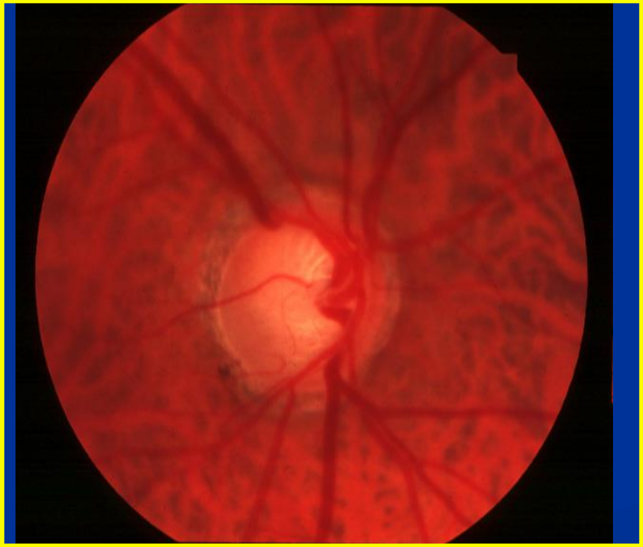

Schwalbe line
Trabeculum
Schlemm canal
Scleral spur
Iris processes
TRT

Primary Open Angle Glaucoma

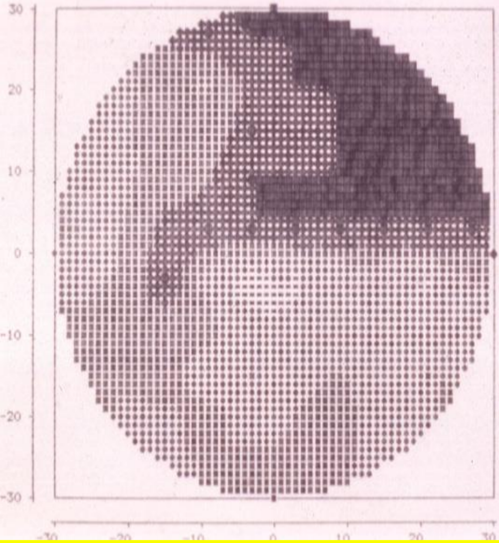
IOP > 21 mmHg



Open angle of normal appearance

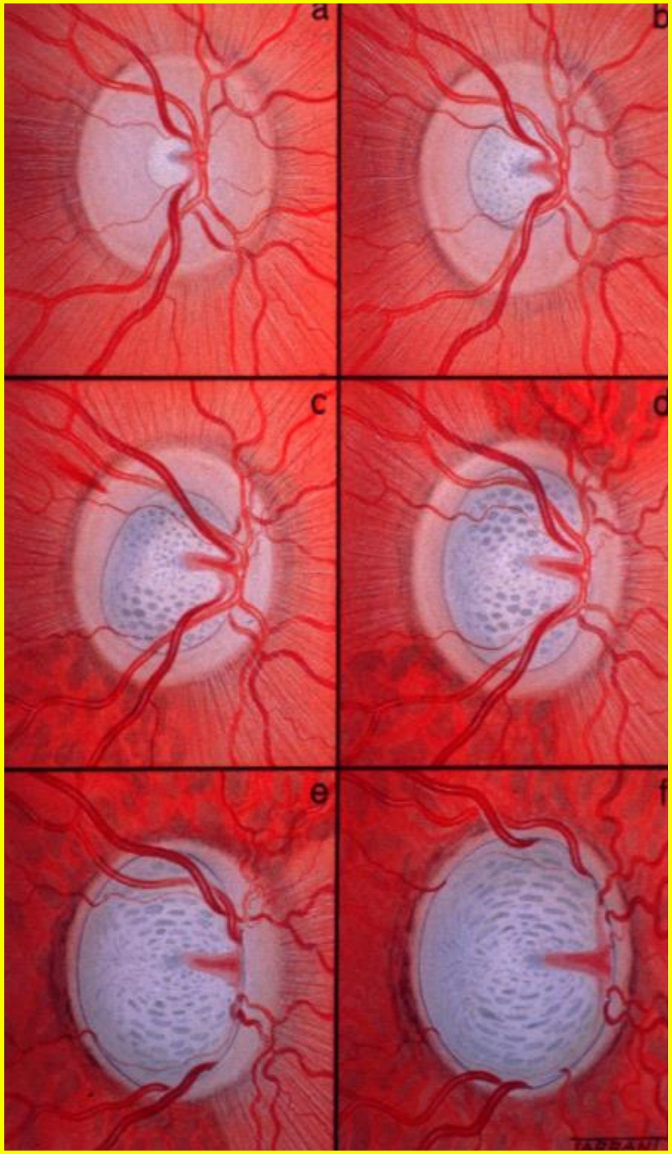


Glaucomatous disc damage


30
20
10
0
-10
-20
-30

Visual field loss

Progression of glaucomatous cupping



a. Normal (c:d ratio 0.2)

b. Concentric enlargement (c:d ratio 0.5)

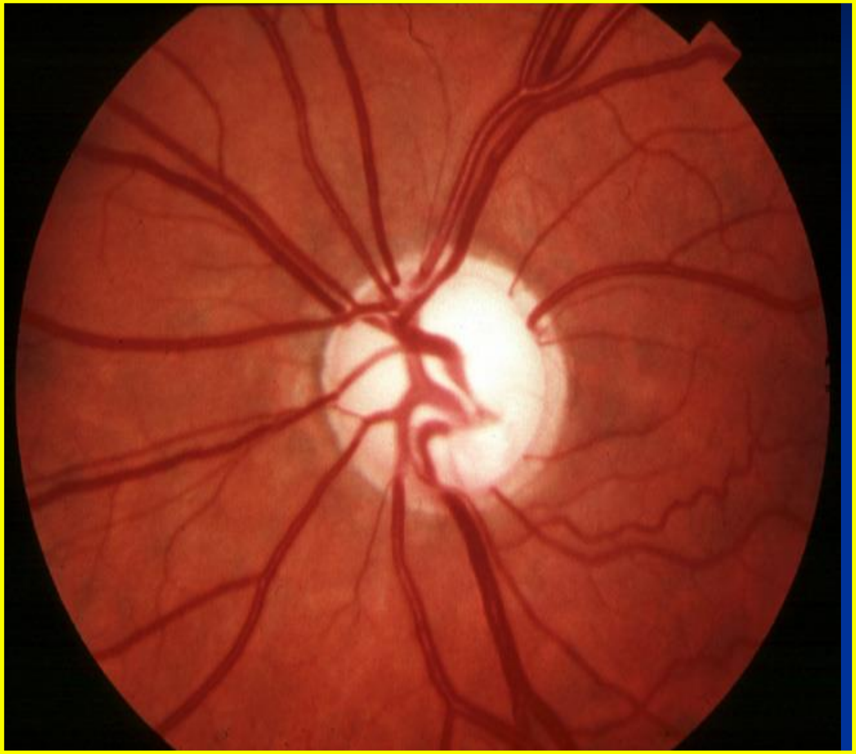
c. Inferior expansion with retinal nerve fibre loss

d. Superior expansion with retinal nerve fibre loss

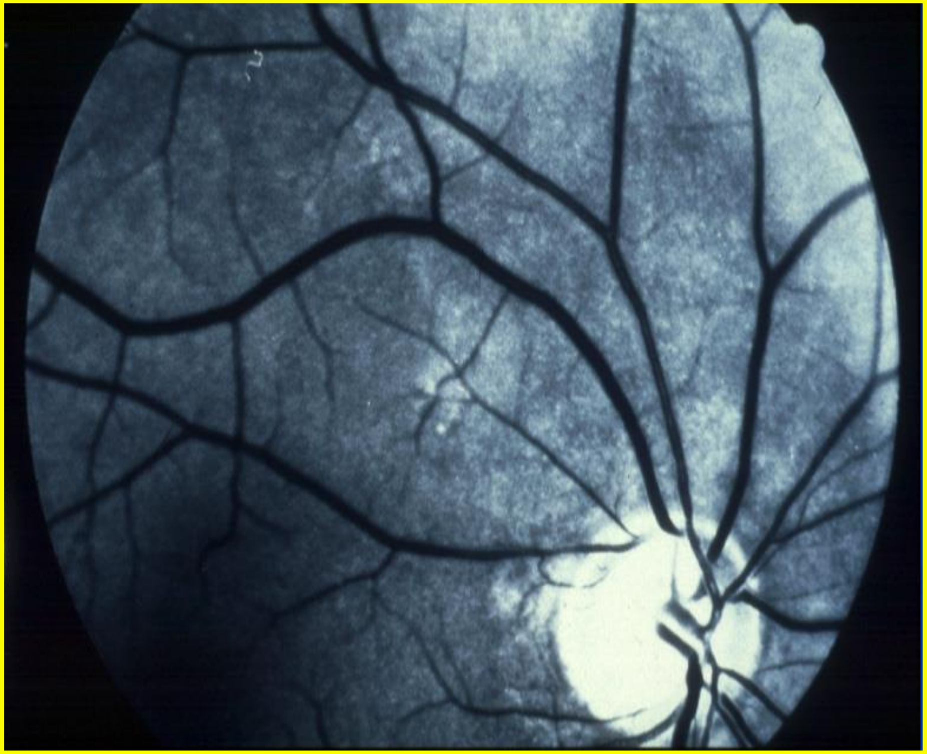
e. Advanced cupping with nasal displacement of vessels

f. Total cupping with loss of all retinal nerve fibres

End-stage damage

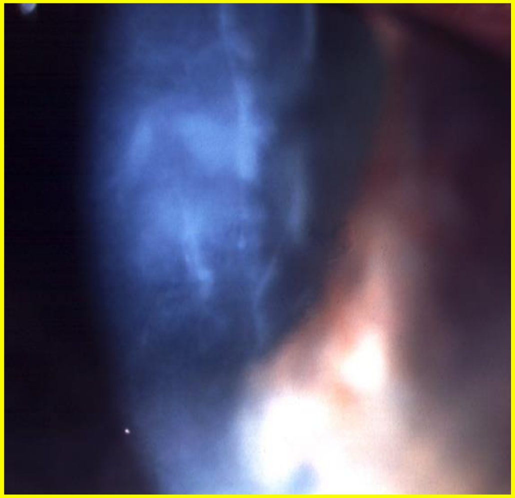


- All neural disc tissue is destroyed
- Disc is white and deeply excavated

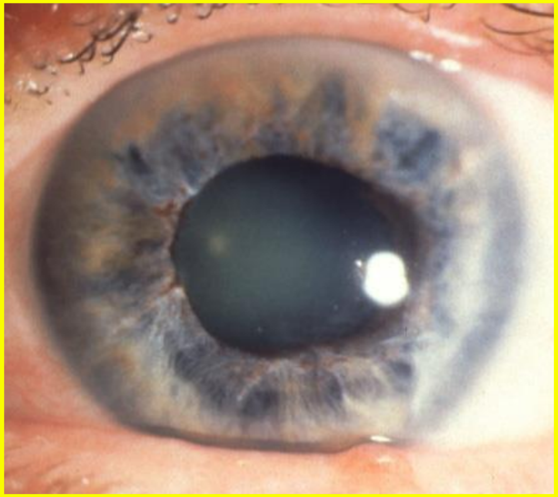


- Atrophy of all retinal nerve fibres
- Striations are absent
- Blood vessels appear dark and sharply defined

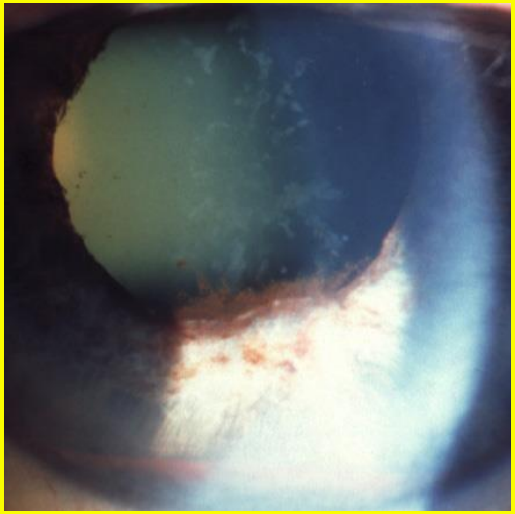
Signs of postcongestive angle-closure glaucoma



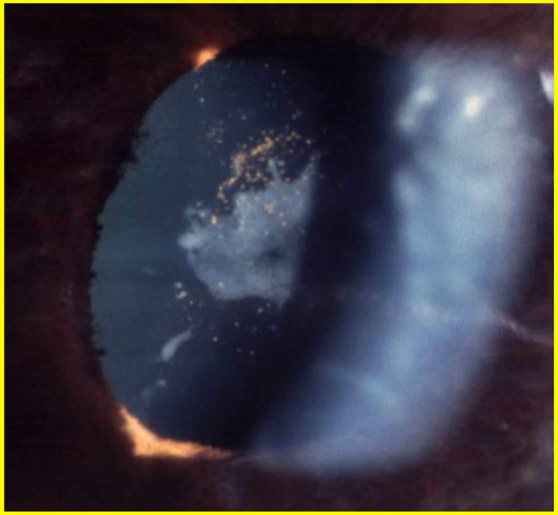
- Folds in Descemet membrane



Stromal iris atrophy with spiral-like configuration



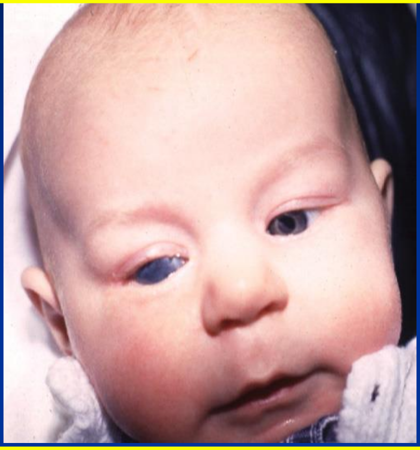
- Posterior synechiae
- Fine pigment on iris



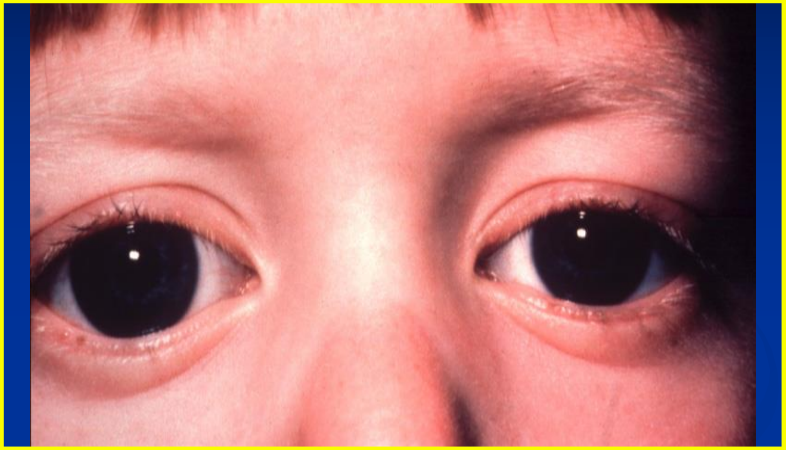
- Fixed dilated pupil
- Glaukomflecken

Clinical features of primary congenital glaucoma

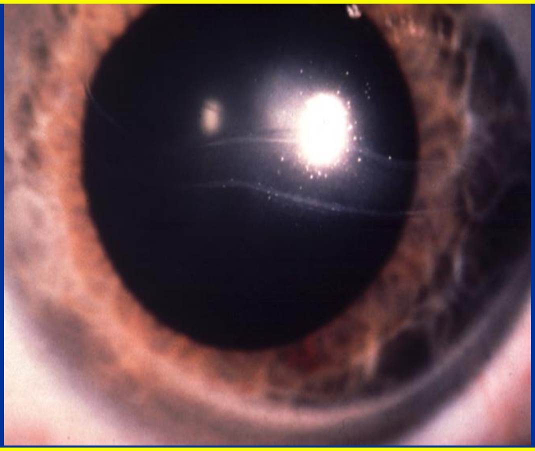
- Depend on age of onset
- Bilateral in 75% but frequently asymmetrical



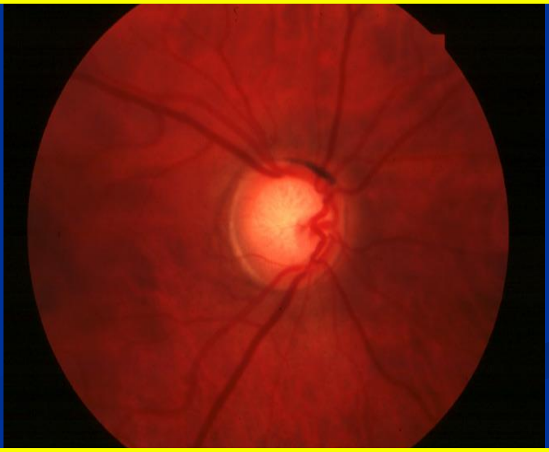
Corneal oedema associated with lacrimation and photophobia



Buphthalmos if IOP becomes elevated prior to age 3 years.

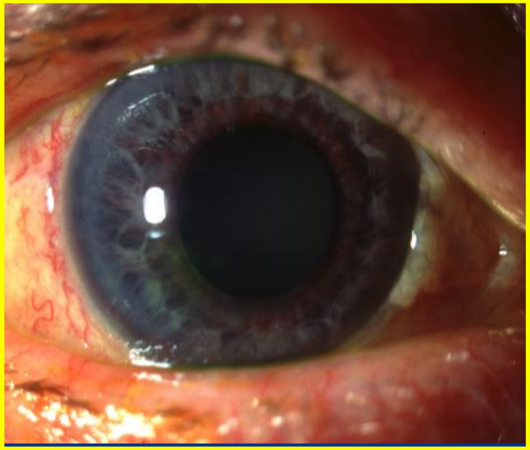


Breaks in Descemet membrane

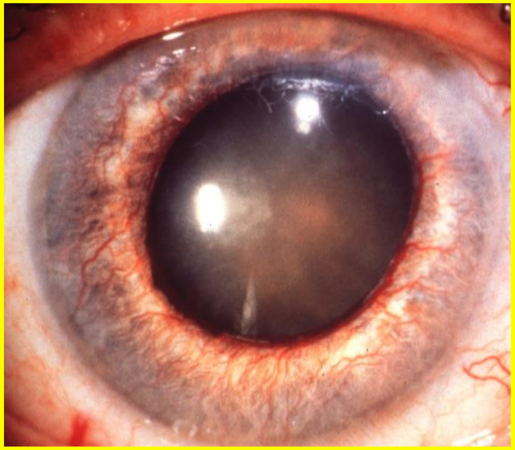


Optic disc cupping

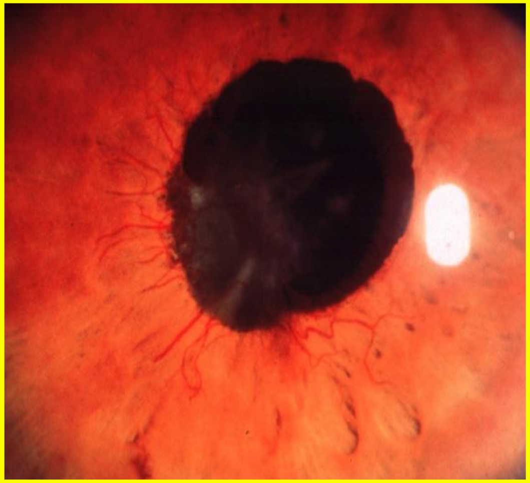
Neovascular Glaucoma (Rubeosis Iridis)



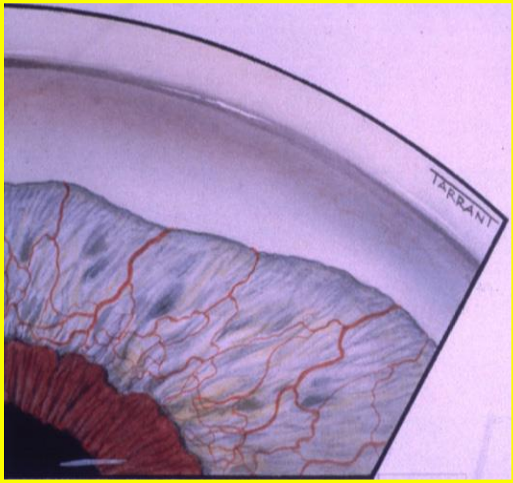
Severely reduced visual acuity, congestion and pain



Severe rubeosis iridis



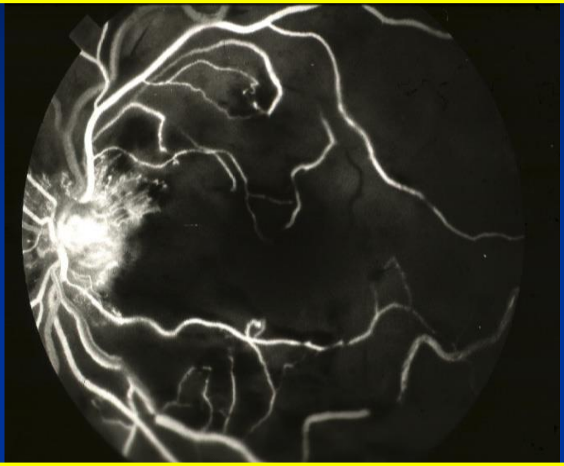
Distortion of pupil and ectropion uveae



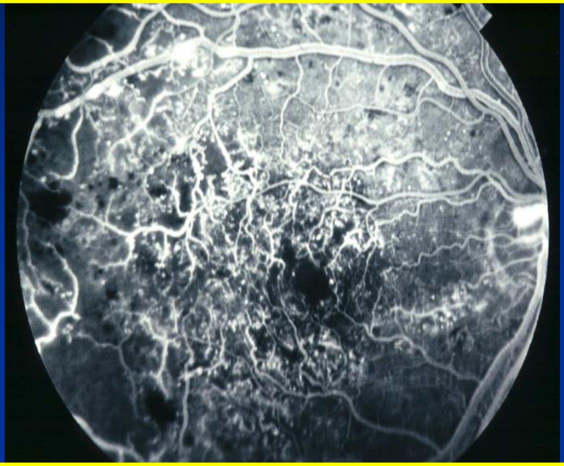
Synechial angle closure

Causes of Neovascular glaucoma

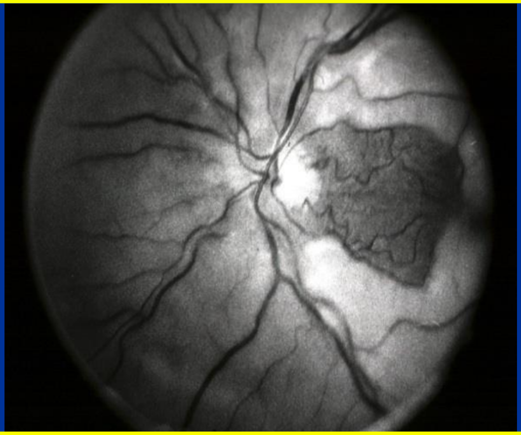
- Common, secondary angle-closure glaucoma



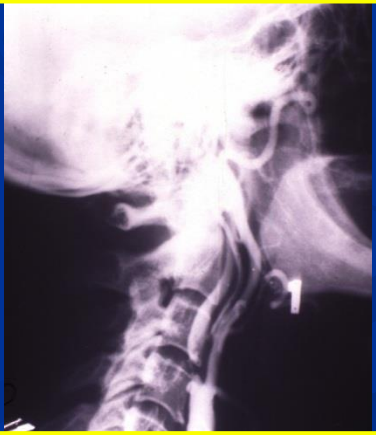
Ischaemic central retinal vein occlusion (most common)



Long-standing diabetes (common)



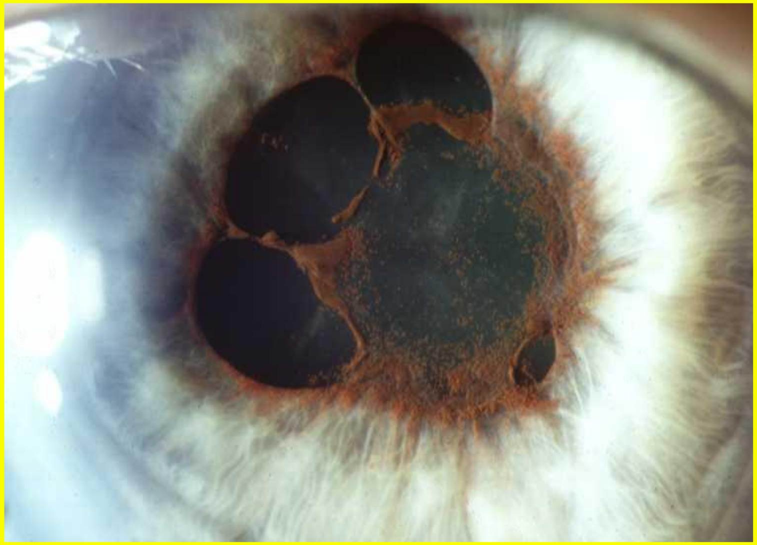
Central retinal artery occlusion (uncommon)



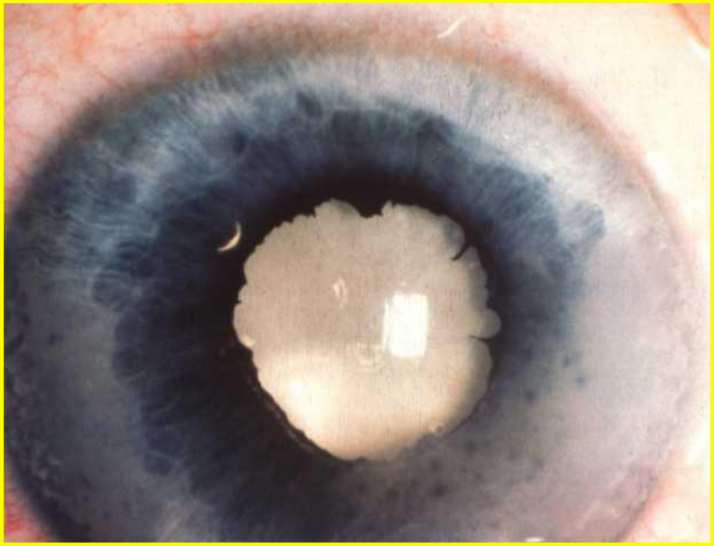
Carotid obstructive disease (uncommon)

UVEITIS

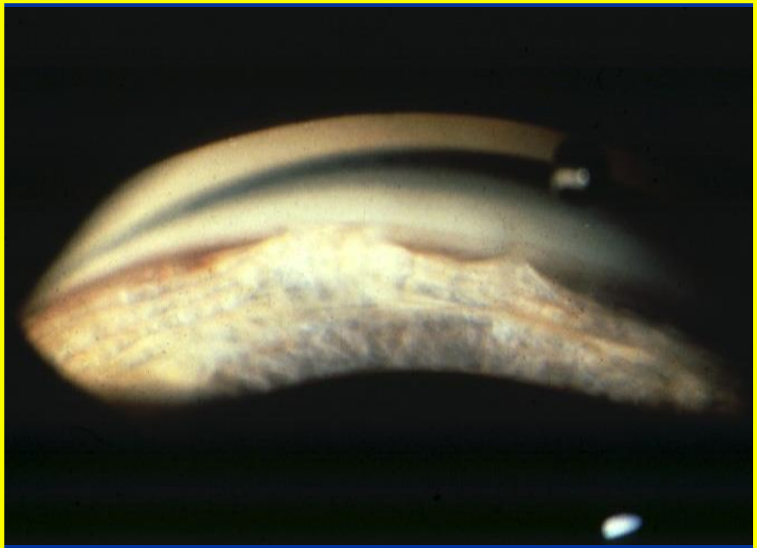
Complications of Anterior Uveitis



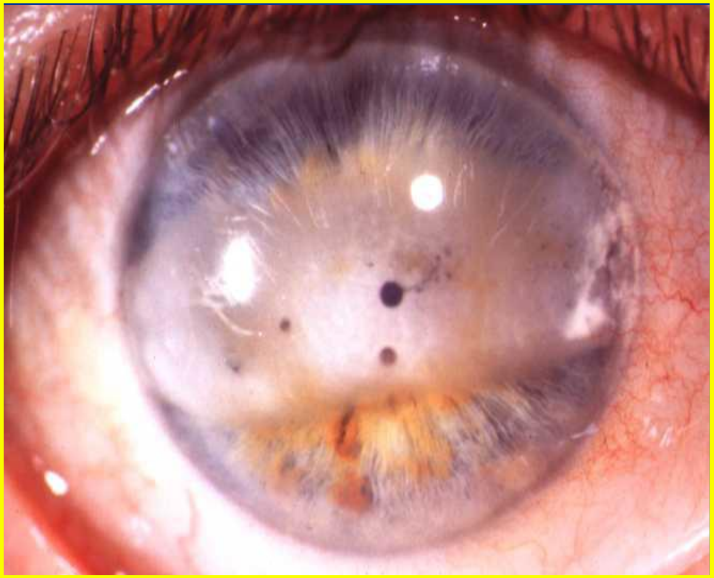
Posterior synechiae - 30%



Cataract -20%



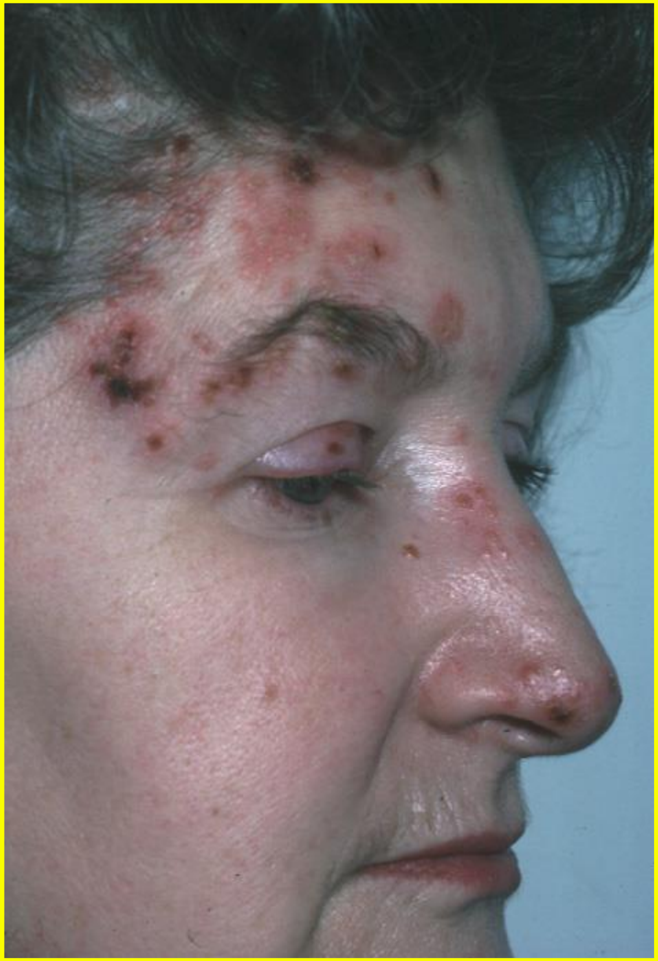
Glaucoma due to PAS - 15%



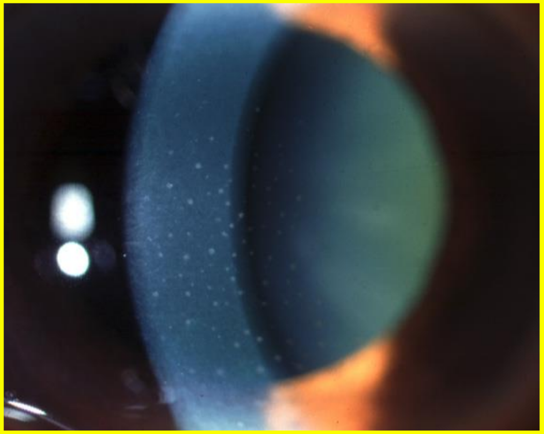
Band keratopathy - 10%

Herpes zoster ophthalmicus

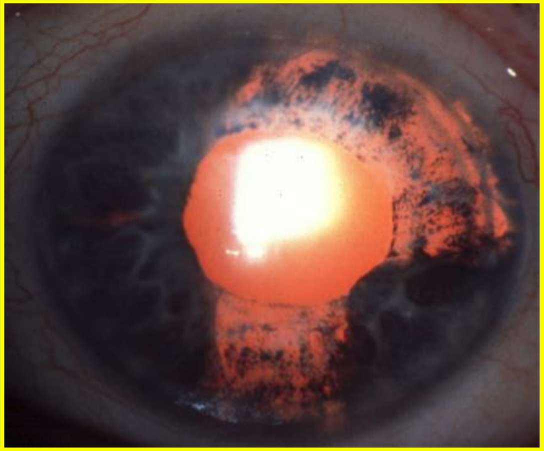
- Iritis in 40% of cases
- Within 3 weeks of onset of rash



Particularly if external nasal branch involved - Hutchinson sign



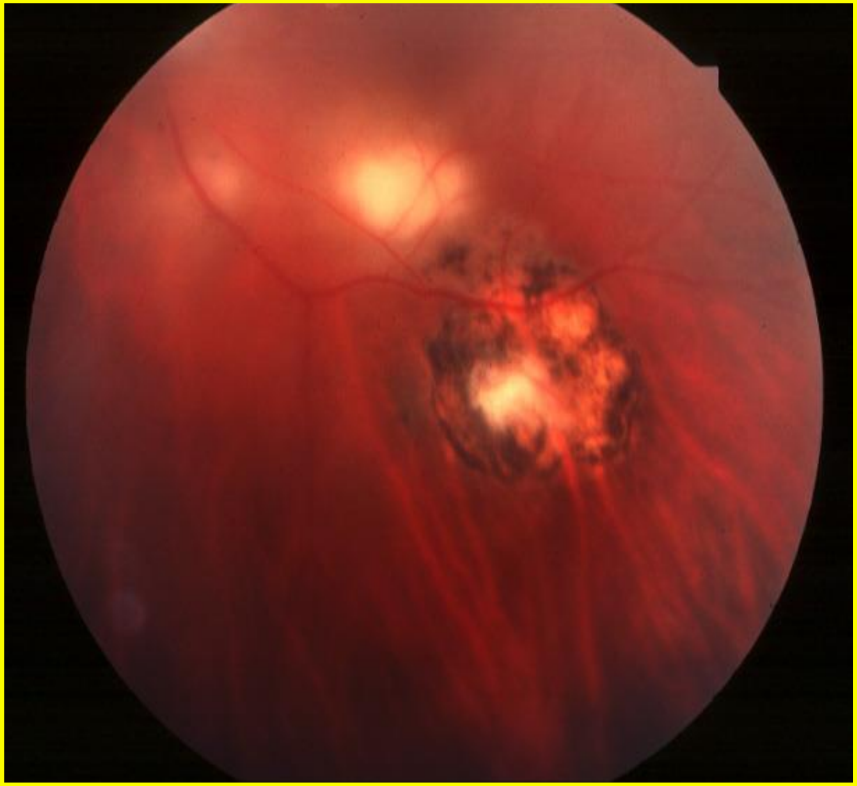
Small-medium KP



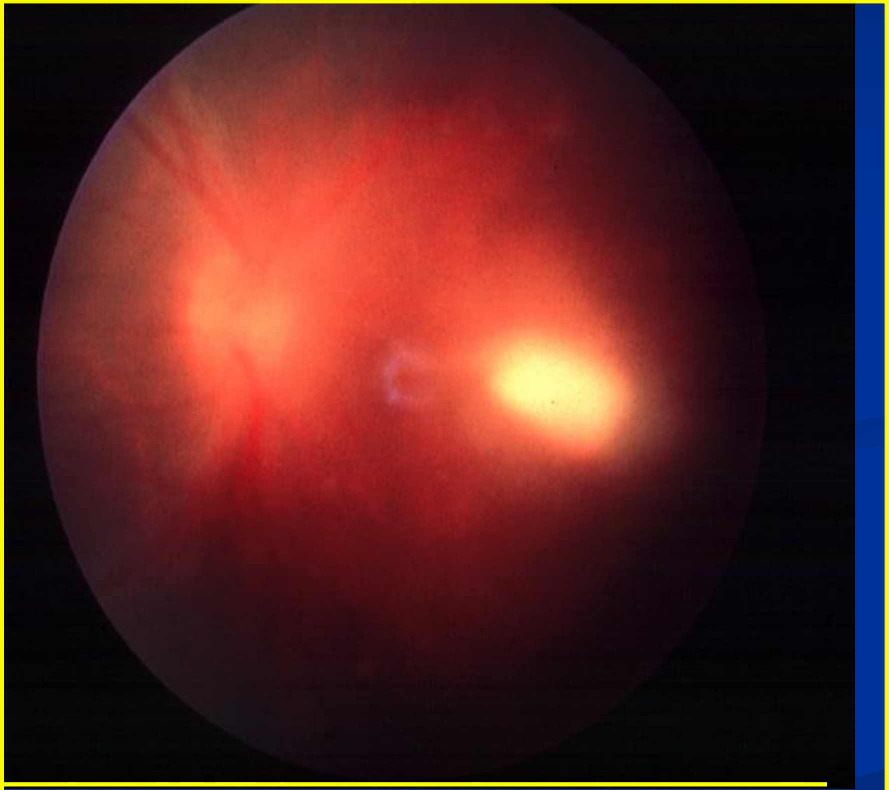
Iris atrophy - 20%

Toxoplasmosis

- Recurrence of healed congenital lesion
- Usually between ages 10-35 years.



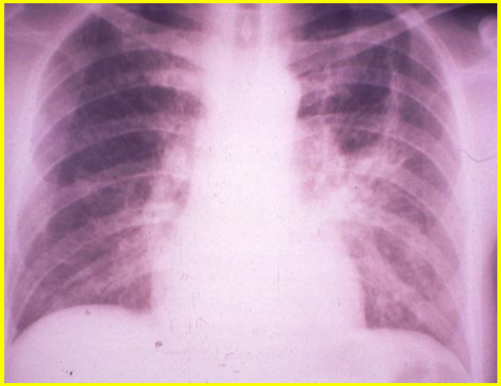
Unifocal retinitis adjacent to old scar
- heals within 1 to 4 months

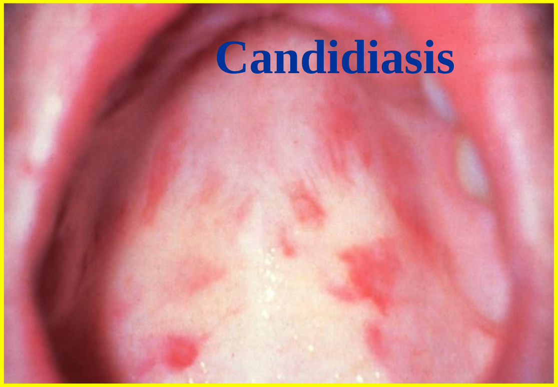


Vitritis may be severe
- 'headlight in fog'

Acquired immune deficiency syndrome (AIDS)

Opportunistic infections



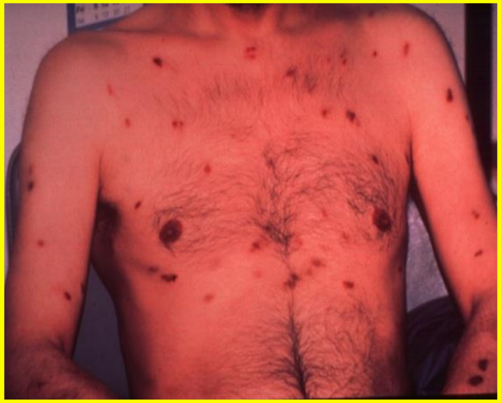


Candidiasis

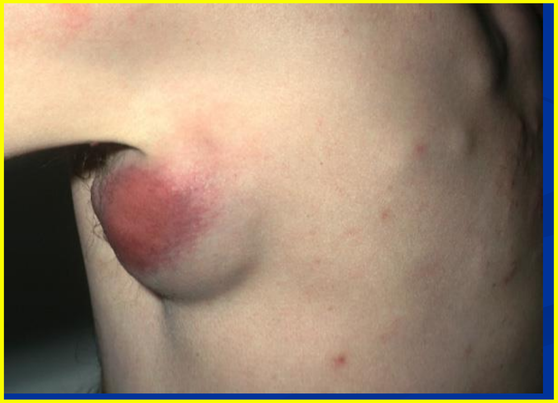
- *Pneumocystis carinii* pneumonia

- Toxoplasmosis
- Atypical mycobacterium
- Cytomegalovirus
- Cryptococcus

Neoplasms

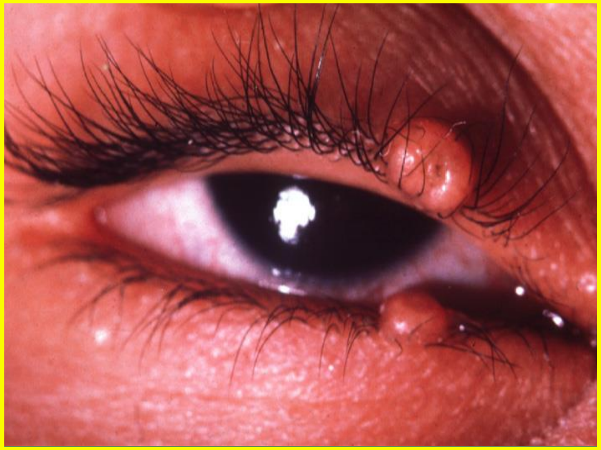


- Kaposi sarcoma

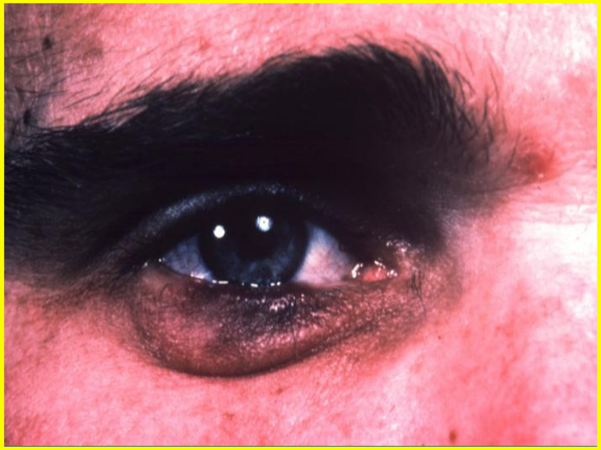


- Lymphoma

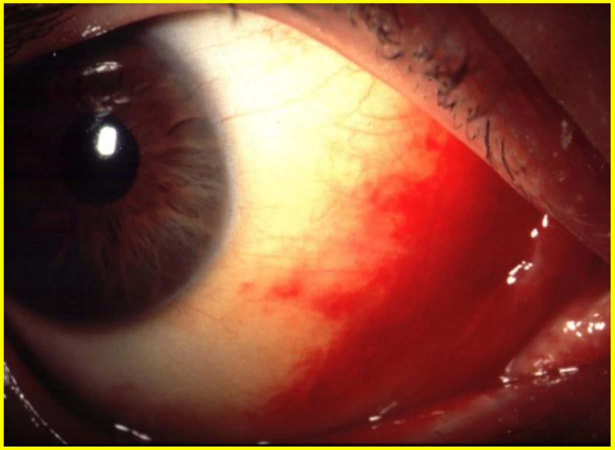
Anterior features



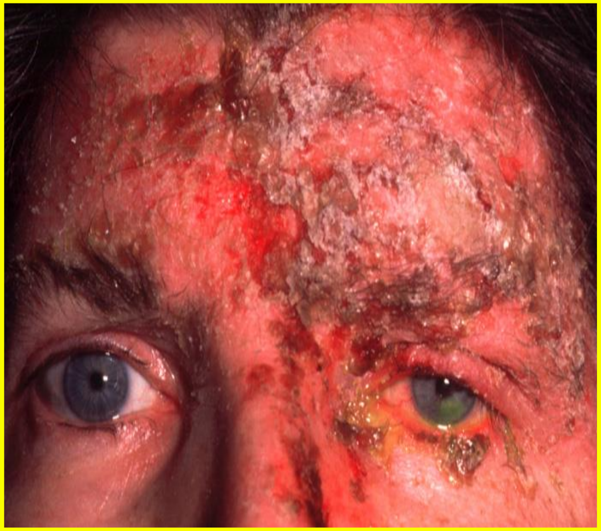
Multiple molluscum contagiosum



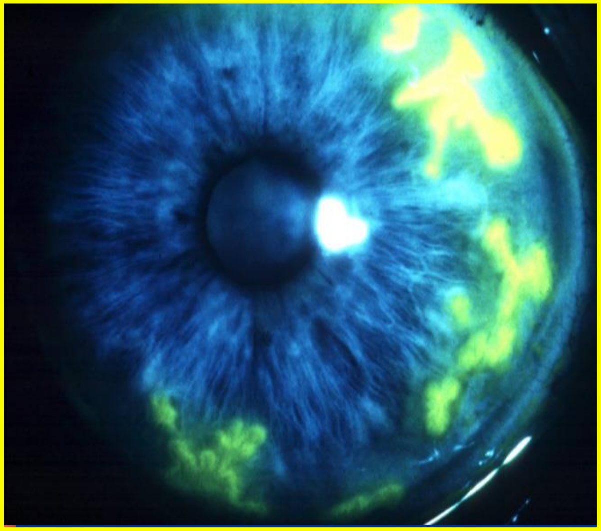
Eyelid Kaposi sarcoma



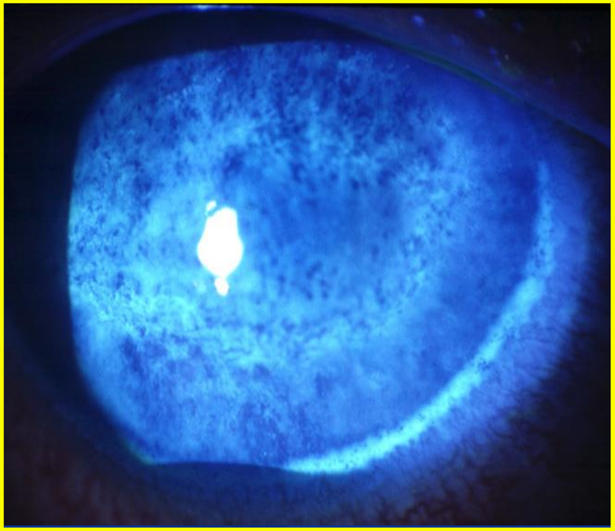
Conjunctival Kaposi sarcoma



Severe herpes zoster ophthalmicus

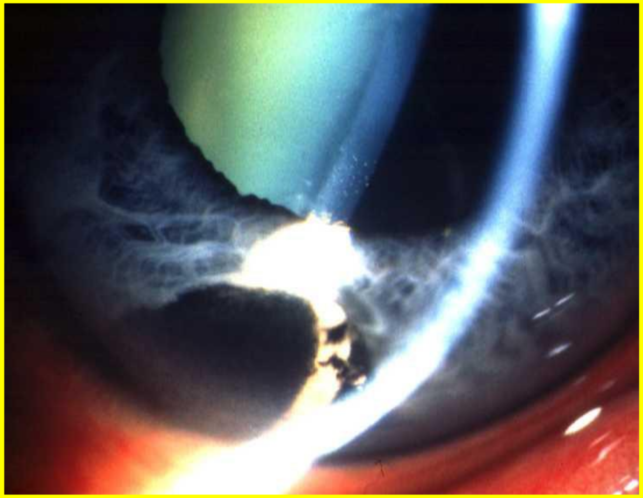


Peripheral herpes simplex keratitis

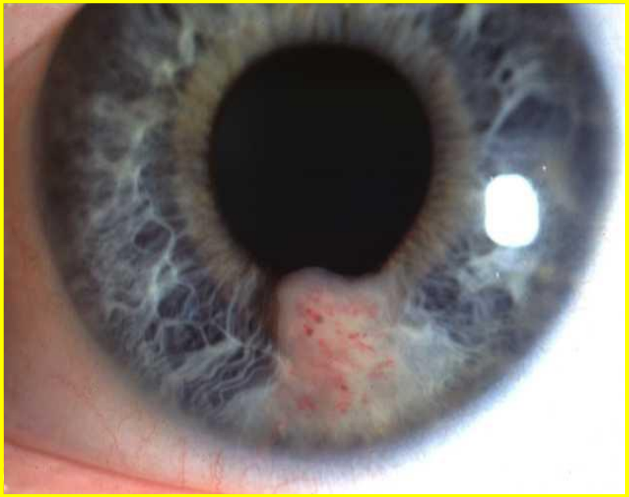


Microsporidial keratitis

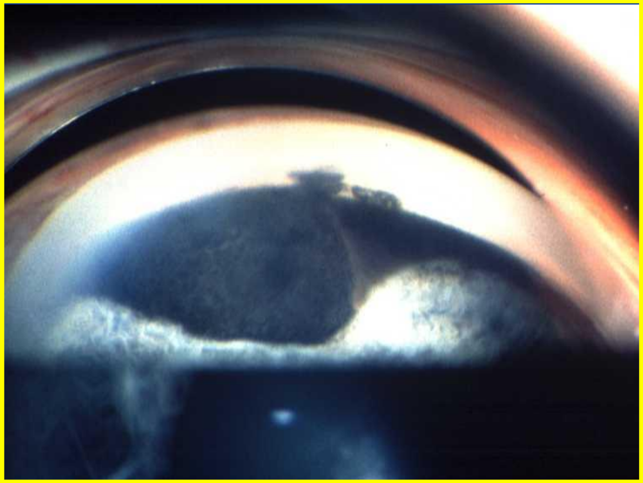
Iris melanoma



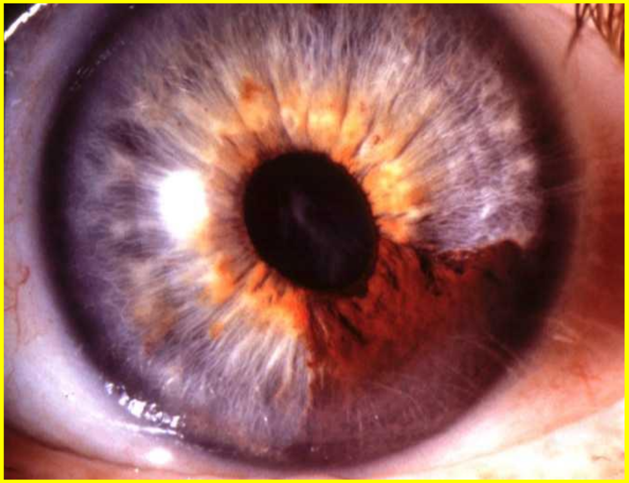
- Usually pigmented nodule at least 3 mm in diameter
- Invariably in inferior half of iris



- Occasionally non-pigmented
- Surface vascularization

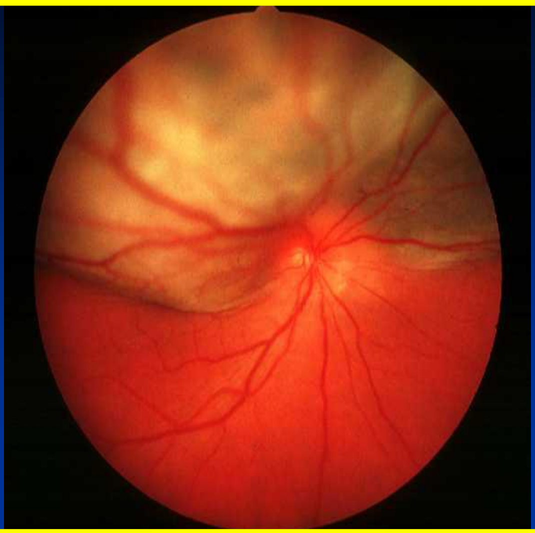


- Angle involvement may cause glaucoma

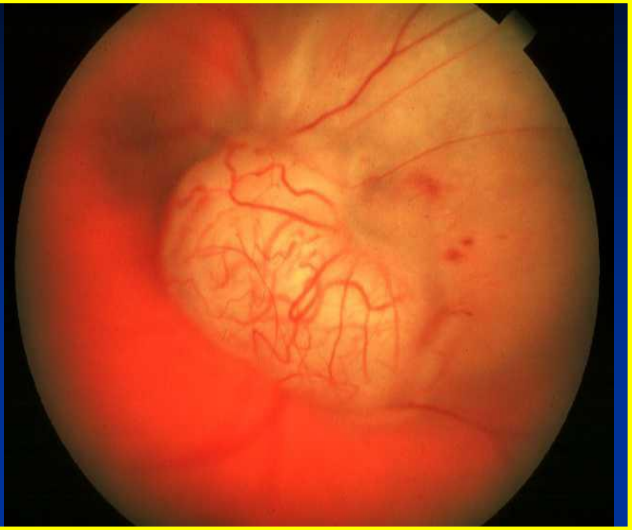


- Pupillary distortion, ectropion uveae and cataract

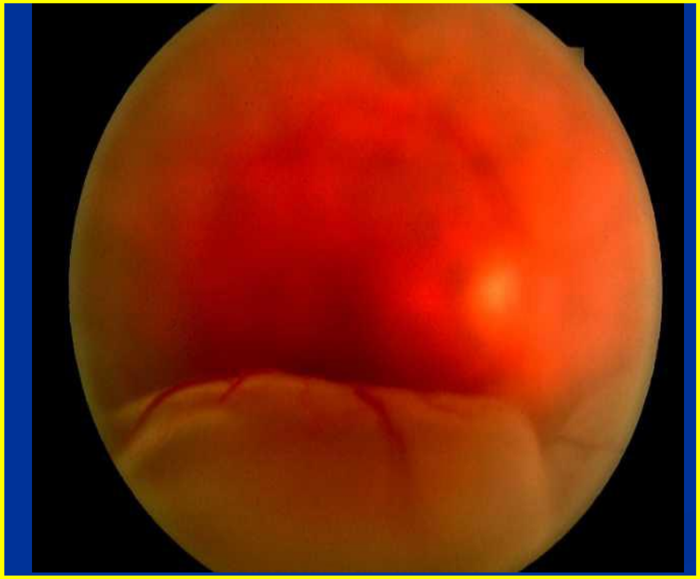
Choroidal melanoma



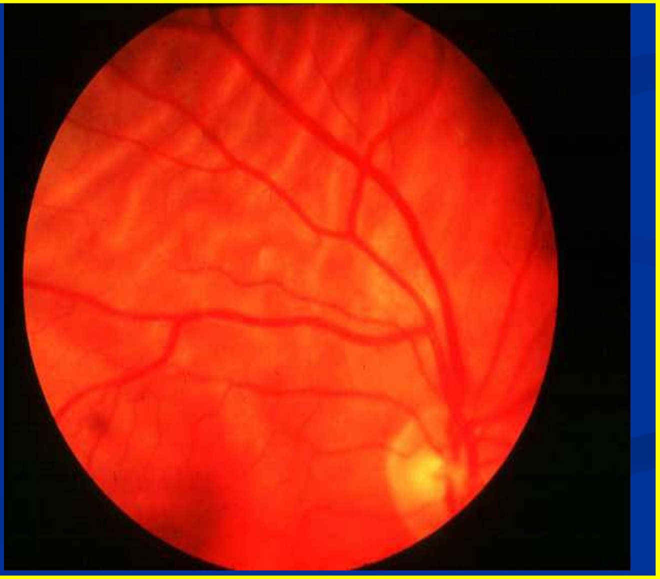
- Brown, elevated, subretinal mass



- Occasionally amelanotic
- Double circulation

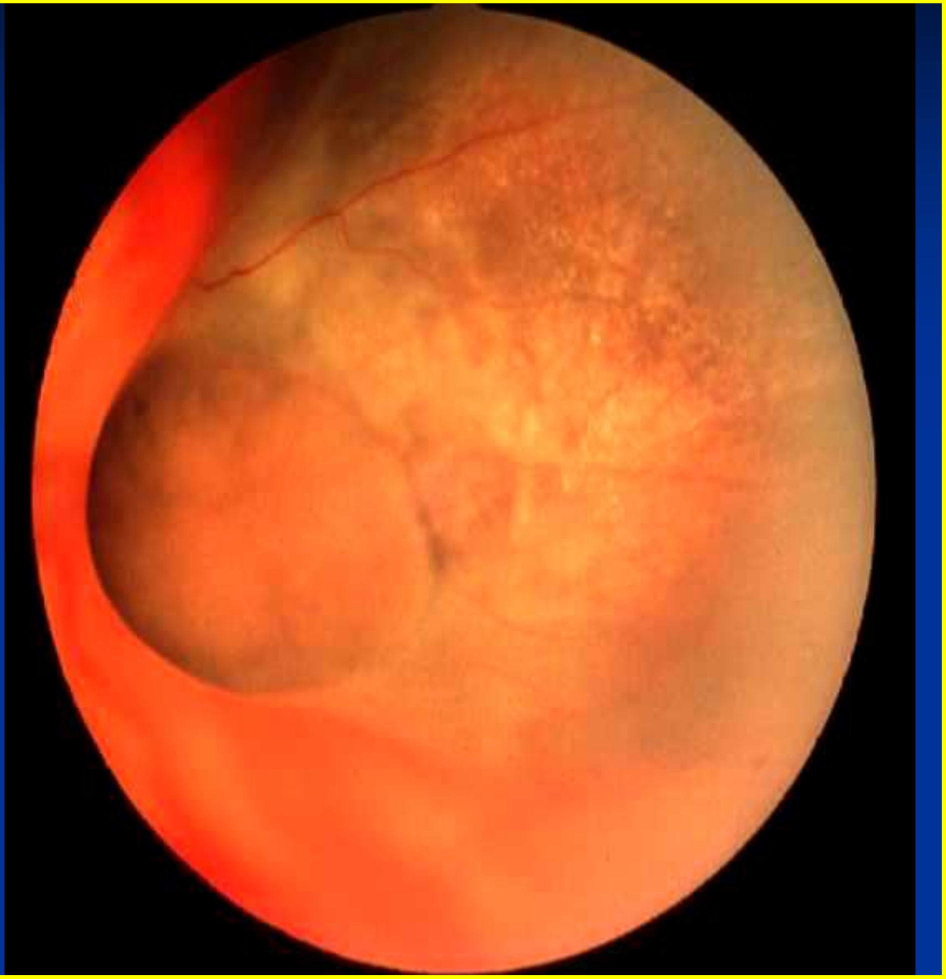


- Secondary retinal detachment

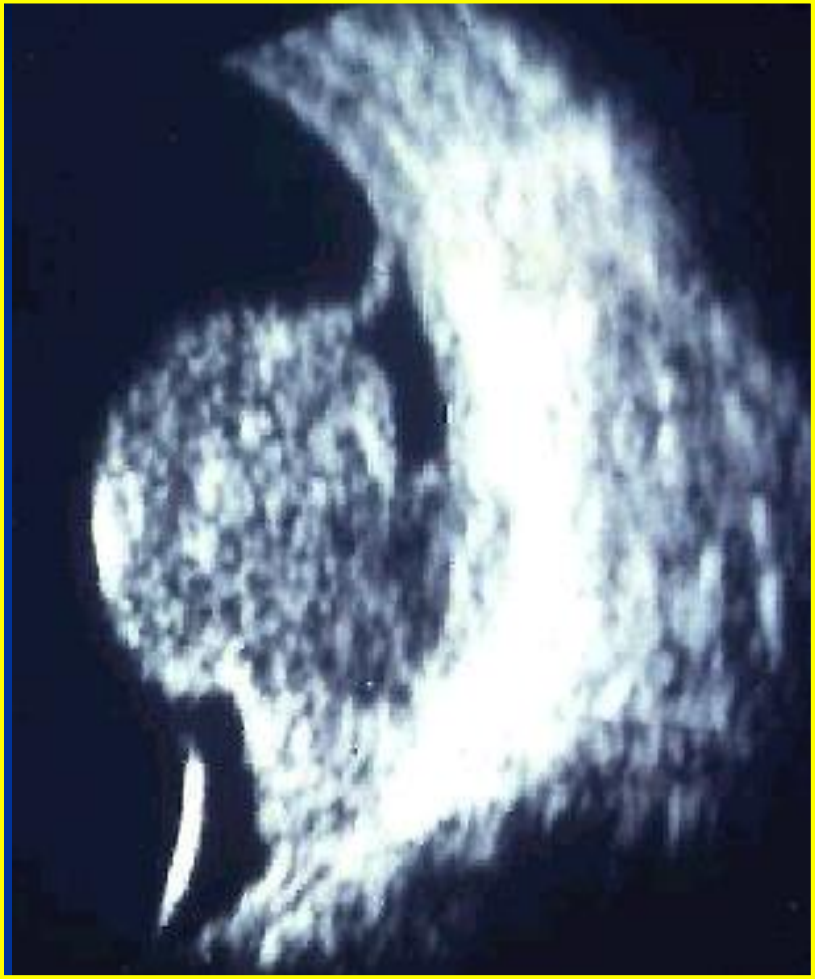


- Choroidal folds

Choroidal melanoma



- Surface orange pigment (lipofuscin) is common
- Mushroom-shaped if breaks through Bruch's membrane



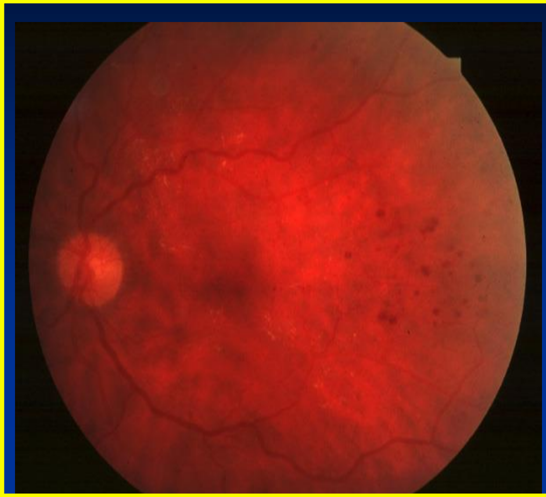
- Ultrasound - acoustic hollowness, choroidal excavation and orbital shadowing

RETINA

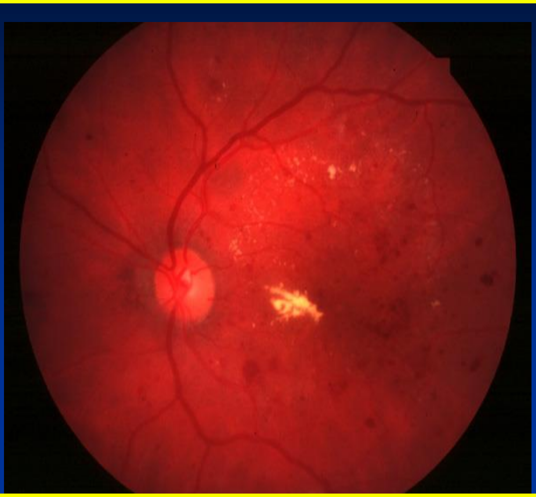
DIABETIC RETINOPATHY

1. Background diabetic retinopathy
2. Pre-proliferative diabetic retinopathy
3. Proliferative diabetic retinopathy
4. Diabetic Maculopathies
    - Focal
    - Diffuse
    - Ischaemic

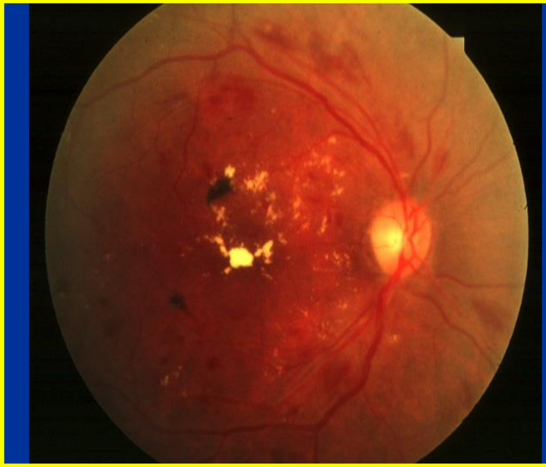
Background diabetic retinopathy



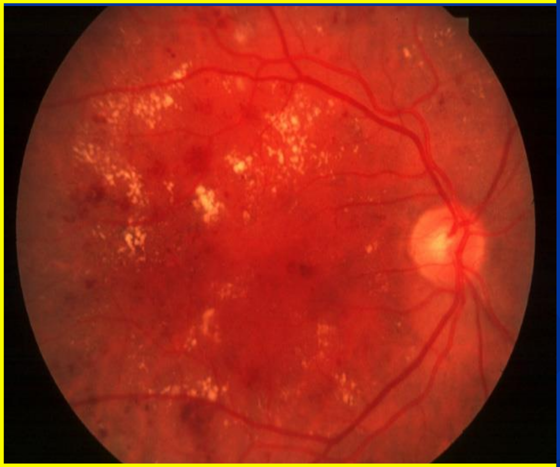
Microaneurysms usually temporal to fovea



Intraretinal dot and blot haemorrhages



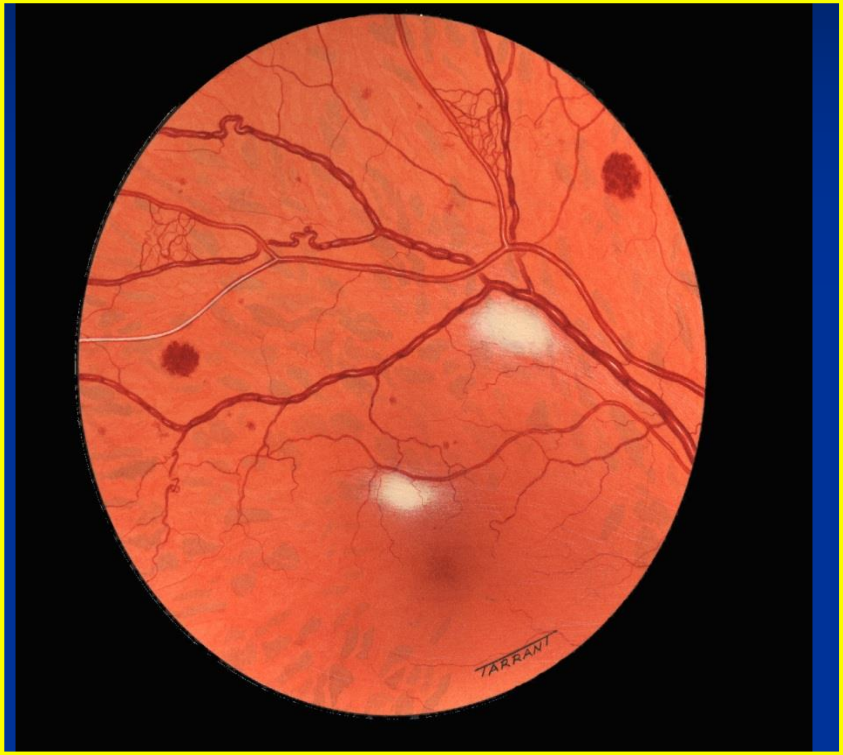
Hard exudates frequently arranged in clumps or rings



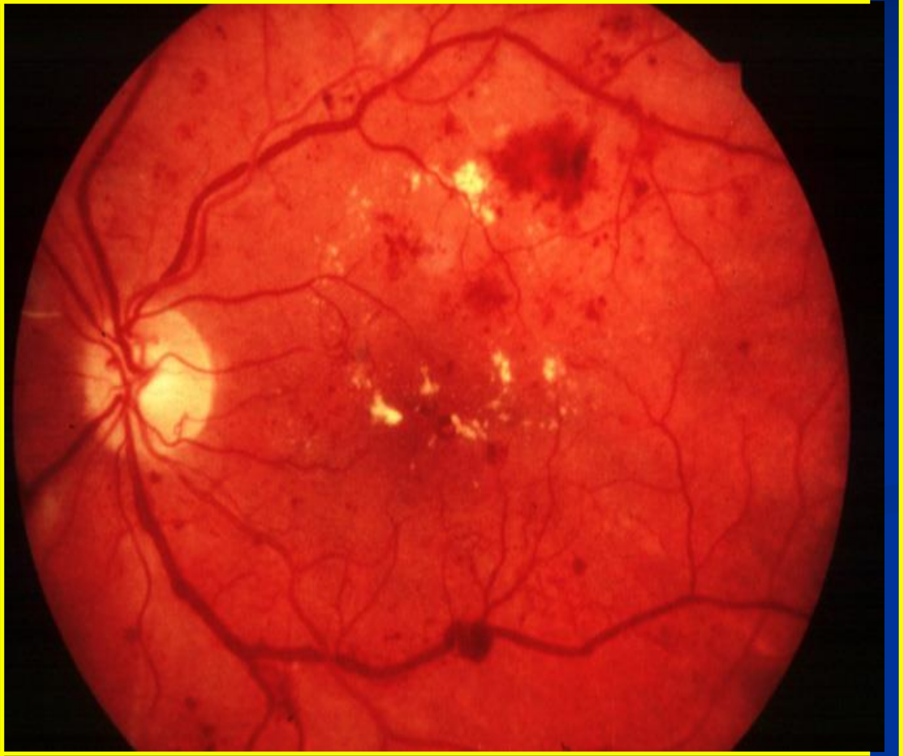
Retinal oedema seen as thickening on biomicroscopy

Preproliferative diabetic retinopathy

Signs



- Cotton-wool spots
- Venous irregularities



- Dark blot haemorrhages
- Intraretinal microvascular abnormalities (IRMA)

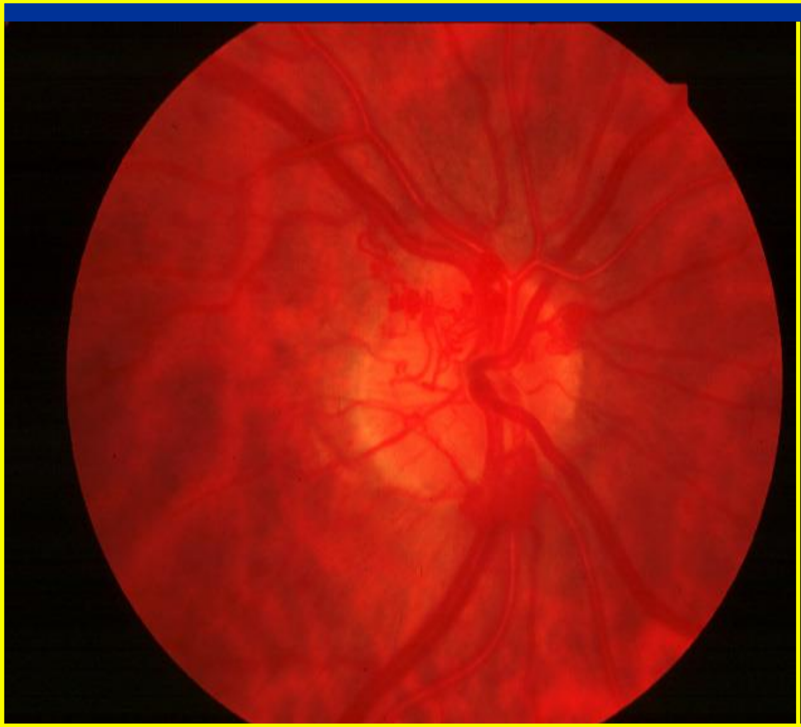
Treatment - not required but watch for proliferative disease

Proliferative diabetic retinopathy

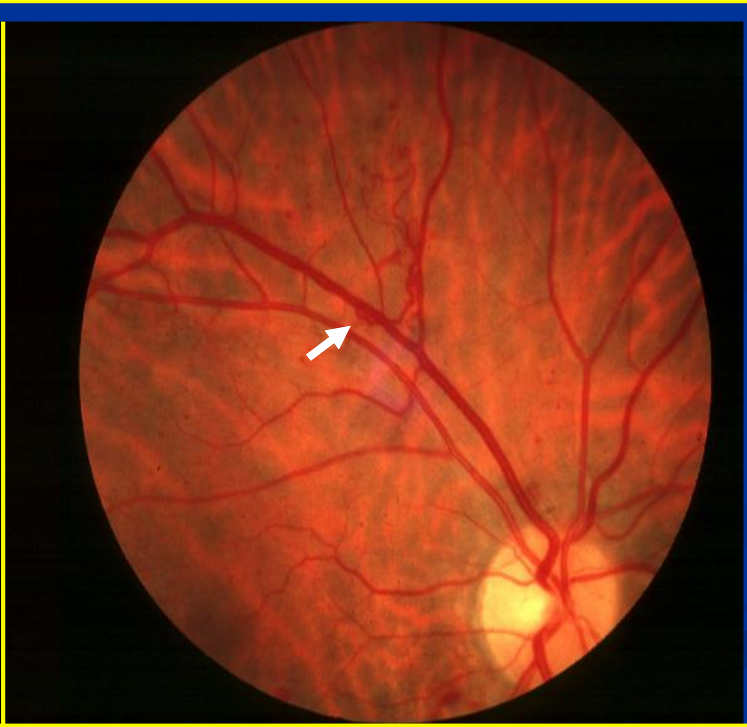
- Affects 5-10% of diabetics
- IDD at increased risk (60% after 30 years)

Neovascularization

- Flat or elevated

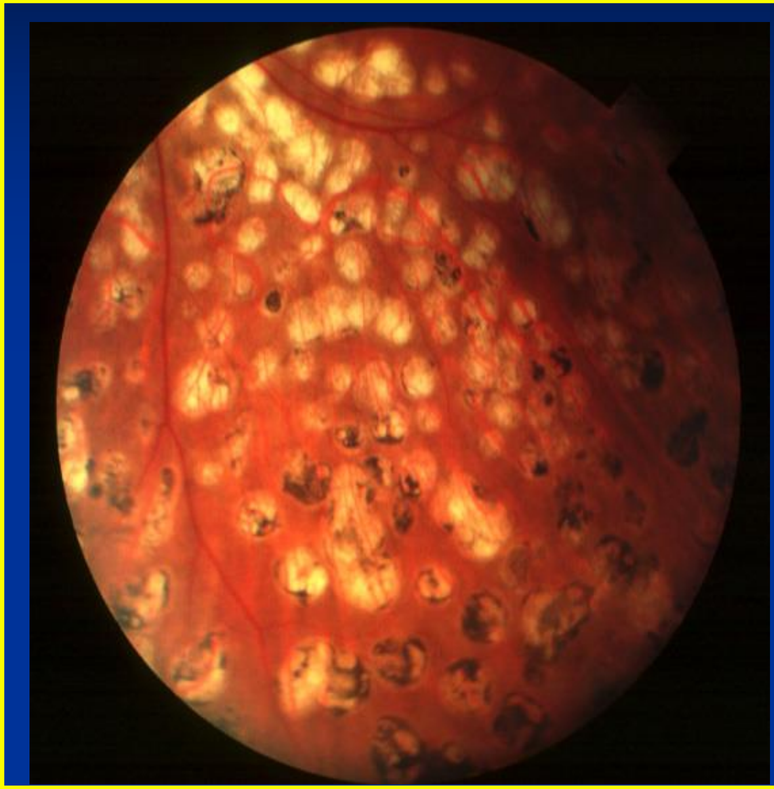


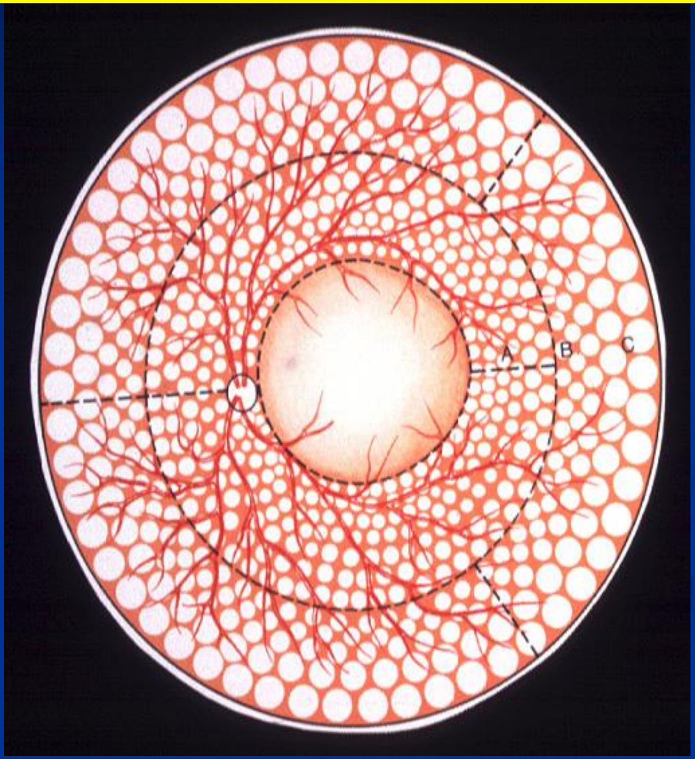
Neovascularization of disc = NVD



Neovascularization elsewhere = NVE

Laser panretinal photocoagulation

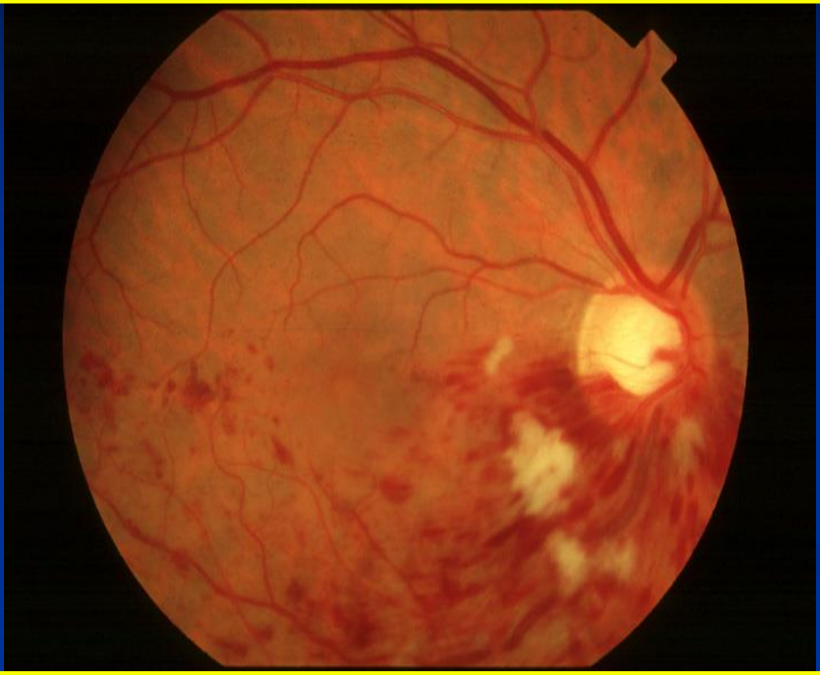




- Area covered by complete PRP
- Follow-up 4 to 8 weeks

Branch retinal vein occlusion (BRVO)

Signs of acute BRVO



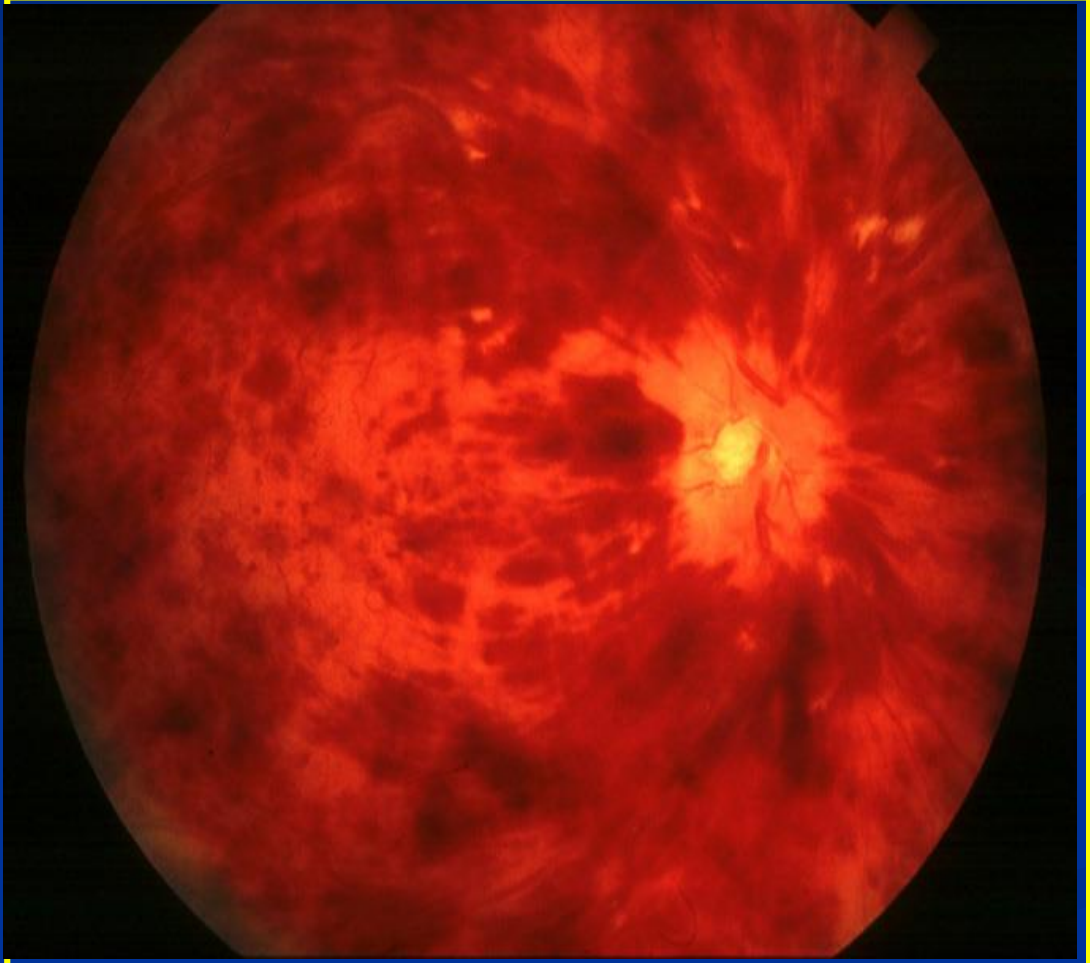
- Venous tortuosity and dilatation
- Flame-shaped and ‘dot-blot’ haemorrhages
- Cotton-wool spots and retinal oedema

Prognosis - VA 6/12 or better after 6 months in 50%

Complications - chronic macular oedema and neovascularization

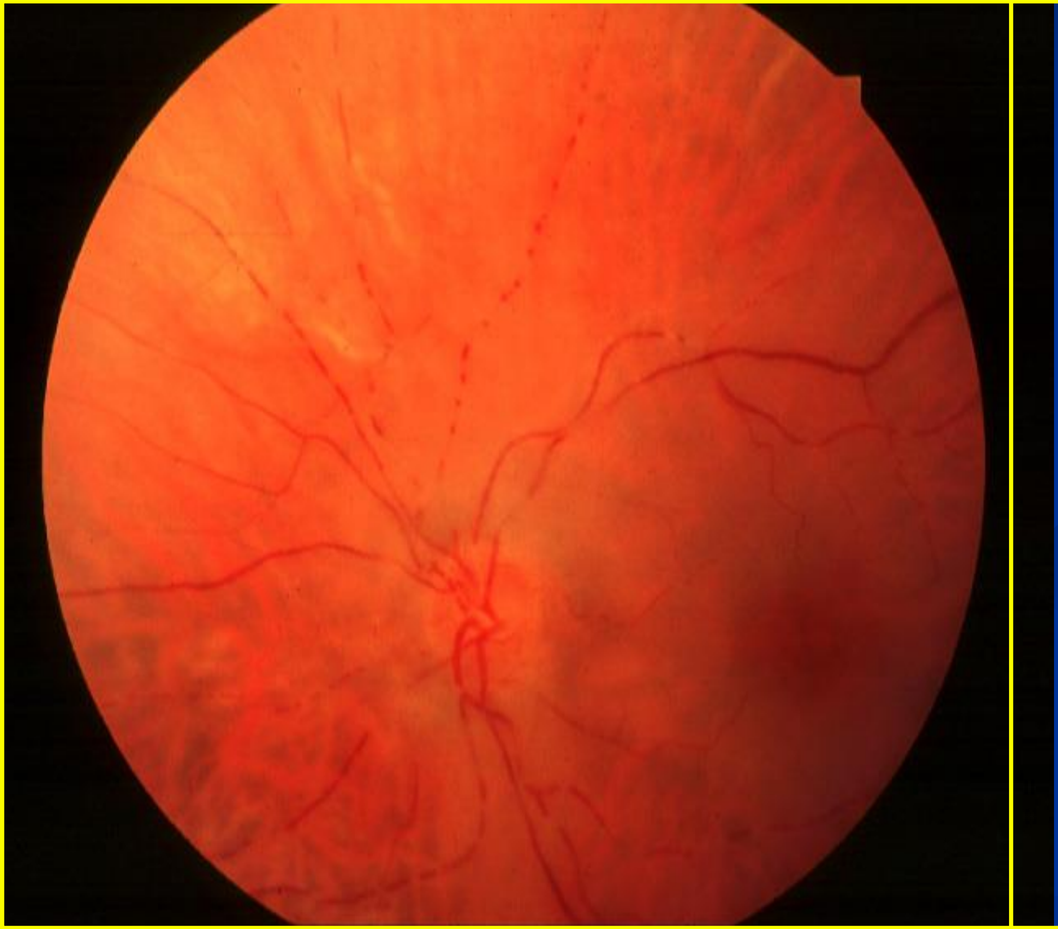
Central retinal vein occlusion (CRVO)

Signs of CRVO



- Venous tortuosity and dilatation
- Retinal haemorrhages
- Cotton-wool spots
- Disc oedema
- Chronic macular oedema

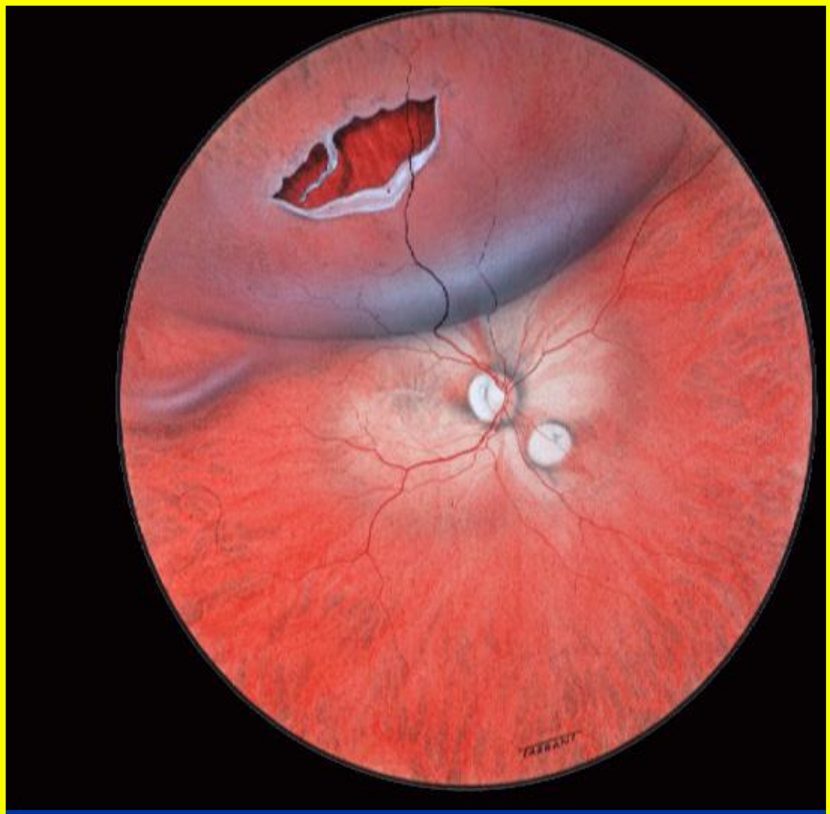
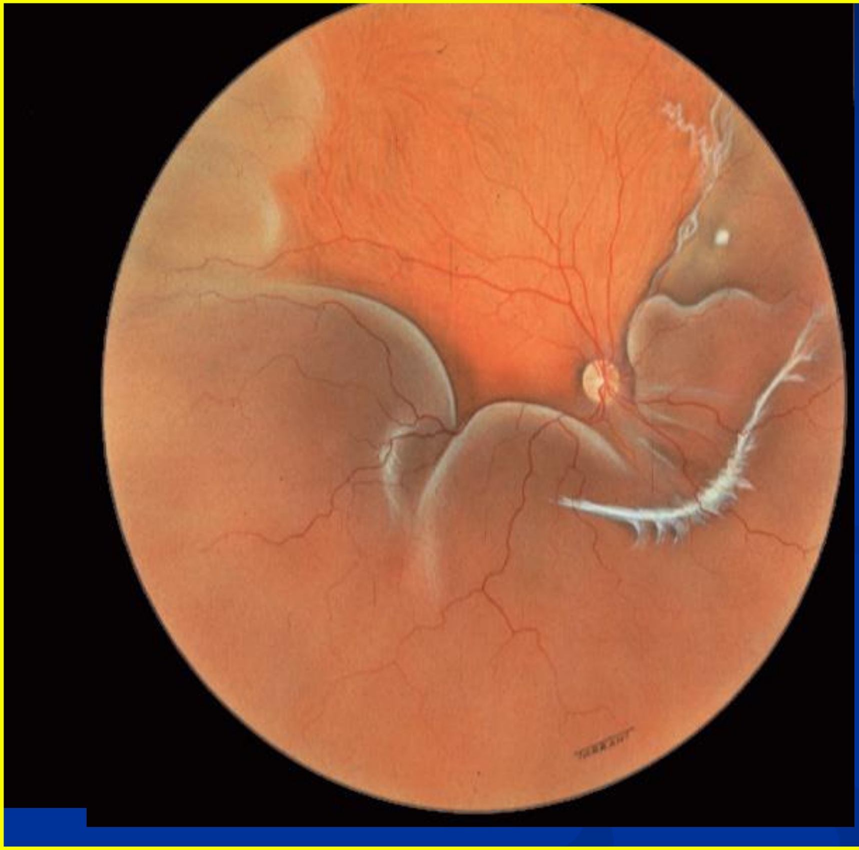
Central retinal artery occlusion (CRAO)



- Retinal whitening
- ‘Cherry-red spot’ at macula
- Arteriolar and venular narrowing
- Sludging and segmentation of blood column (cattle-trucking)
- Very poor prognosis

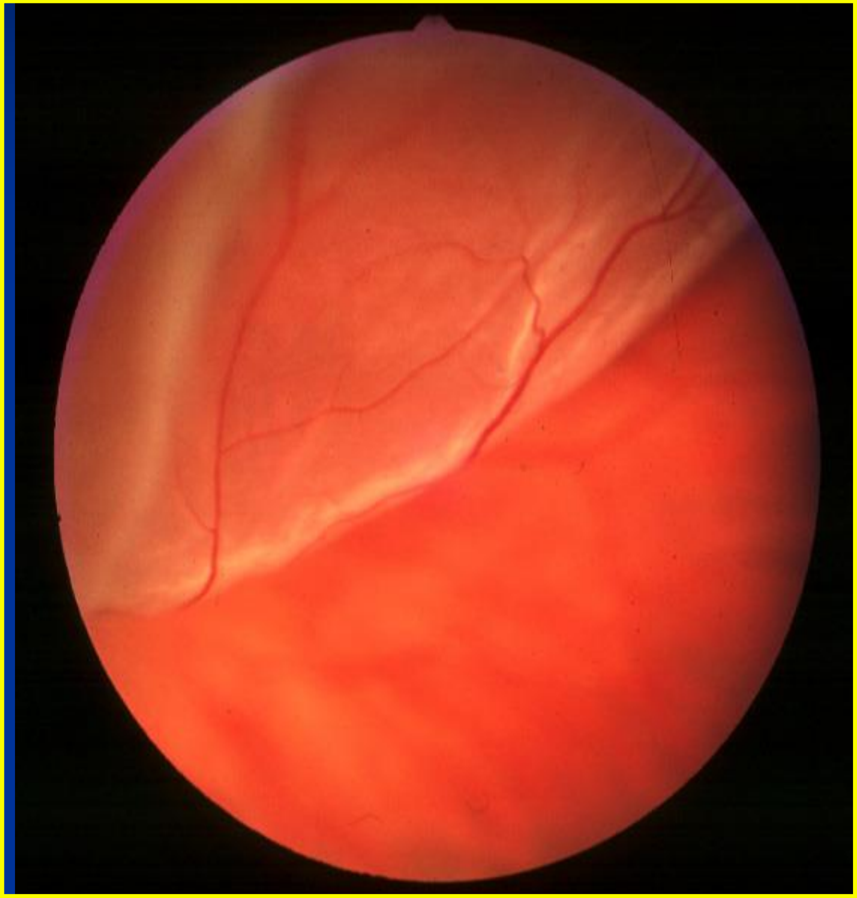
Retinal detachment (RD)

Separation of sensory retina from RPE by subretinal fluid (SRF)

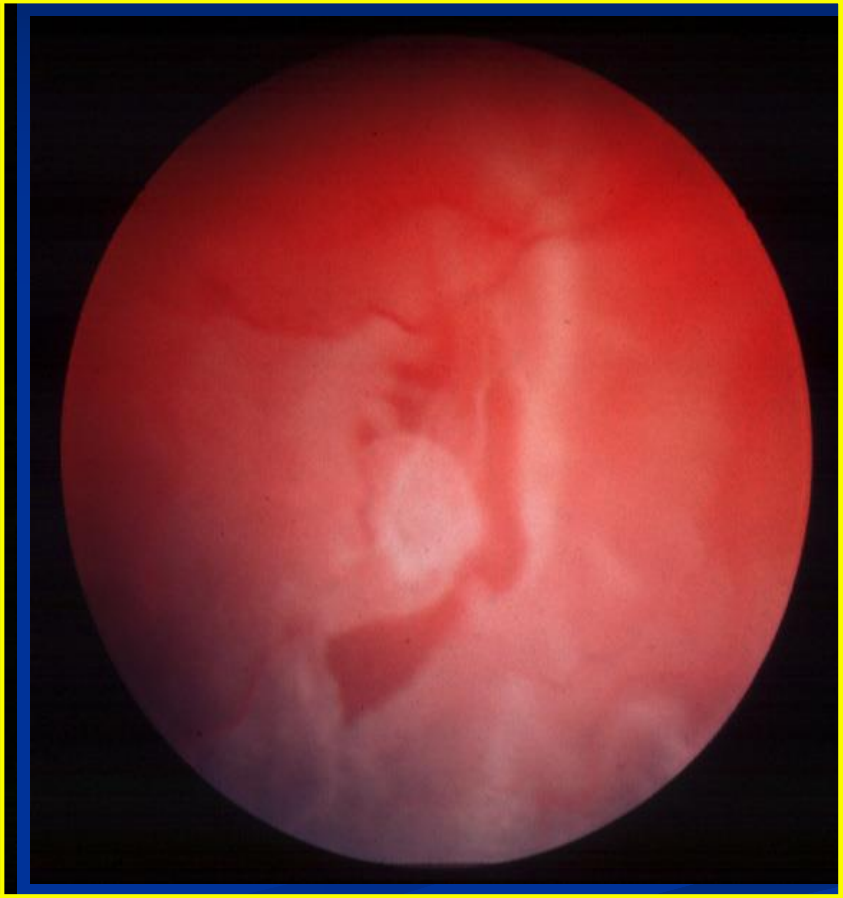
	
Rhegmatogenous - caused by a retinal break	**Non-rhegmatogenous** - tractional or exudative

Fresh Rhegmatogenous RD - signs

- Annual incidence - 1:10,000 of population
- Eventually bilateral in 10%

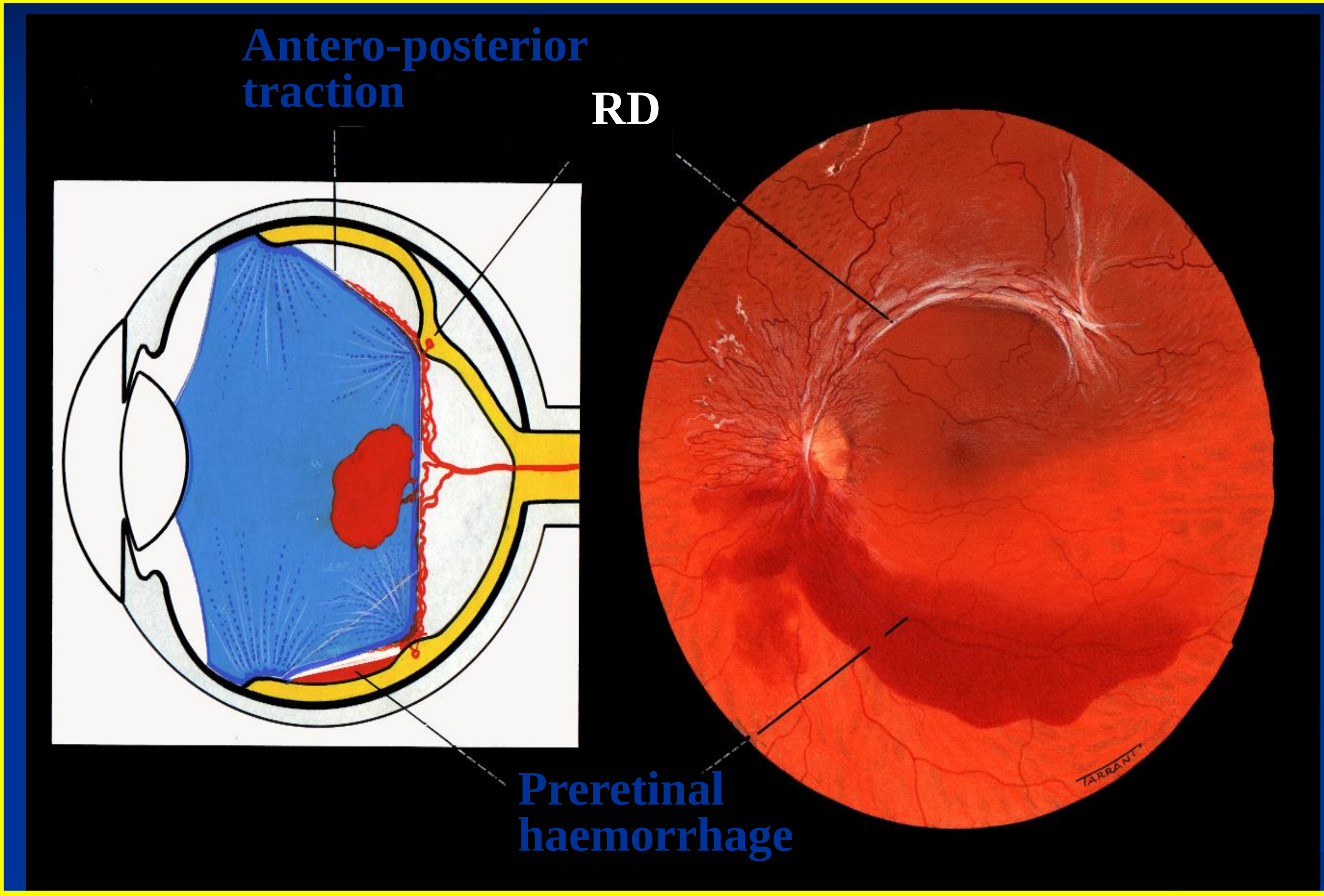


- Convex, deep mobile elevation extending to ora serrata
- Slightly opaque with dark blood vessels

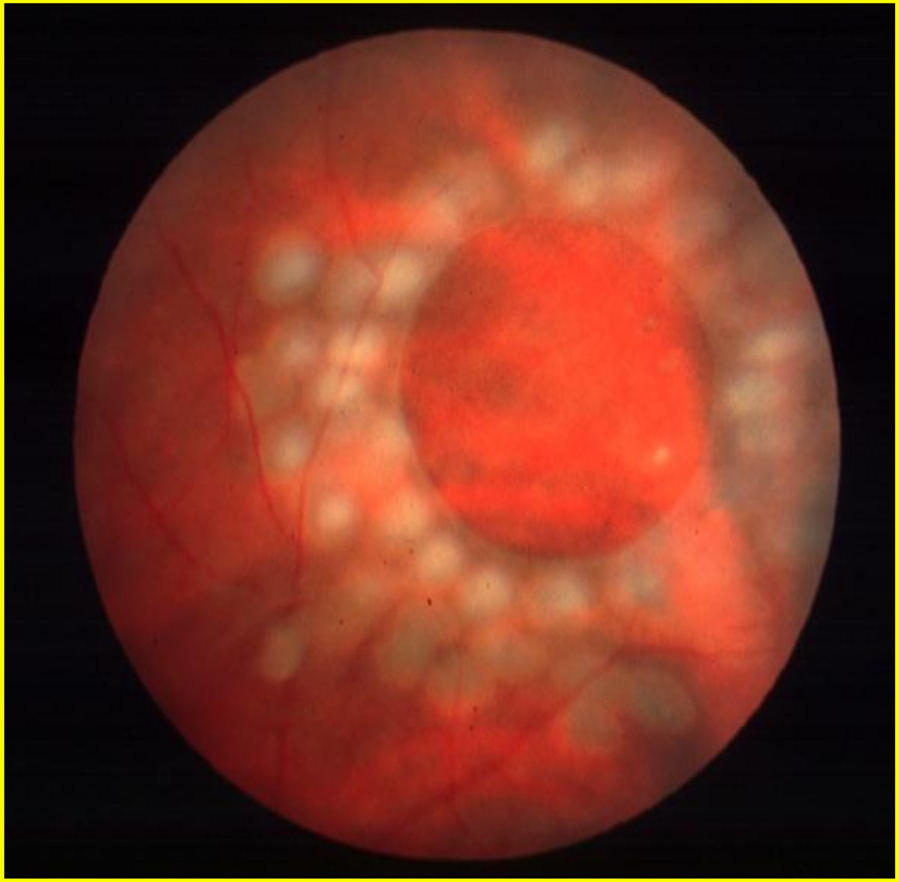


- Loss of choroidal pattern
- Retinal breaks

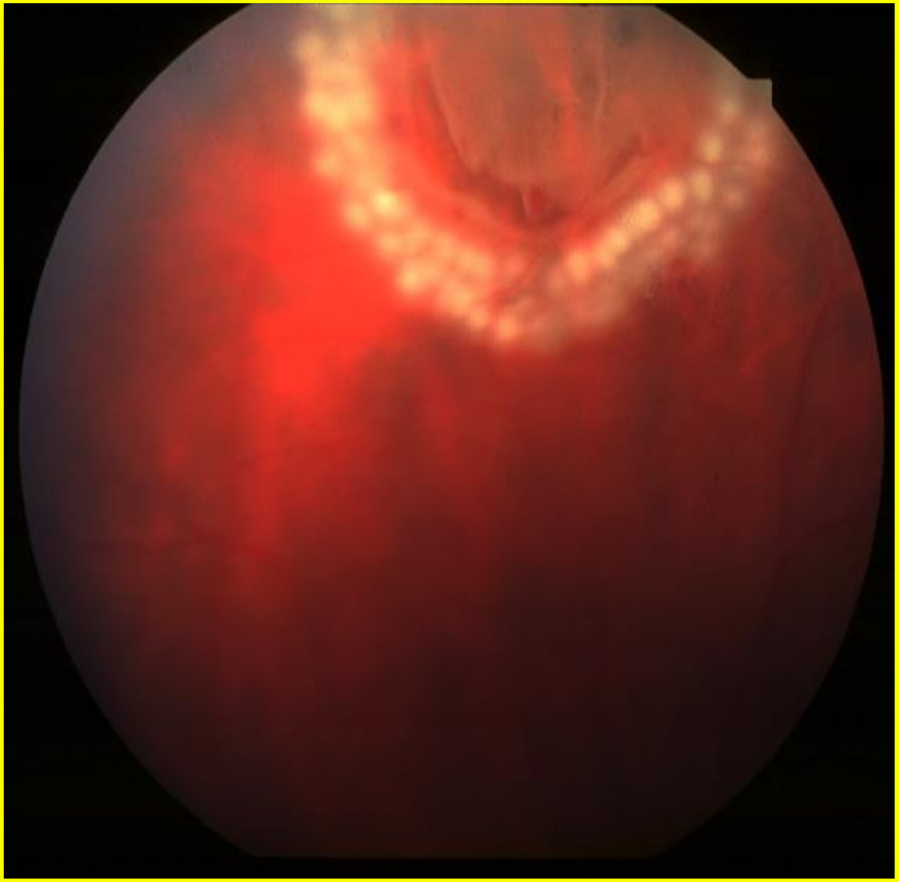
Diabetic Tractional RD


Antero-posterior traction
RD
Preretinal haemorrhage

Prophylactic Argon Laser Photocoagulation

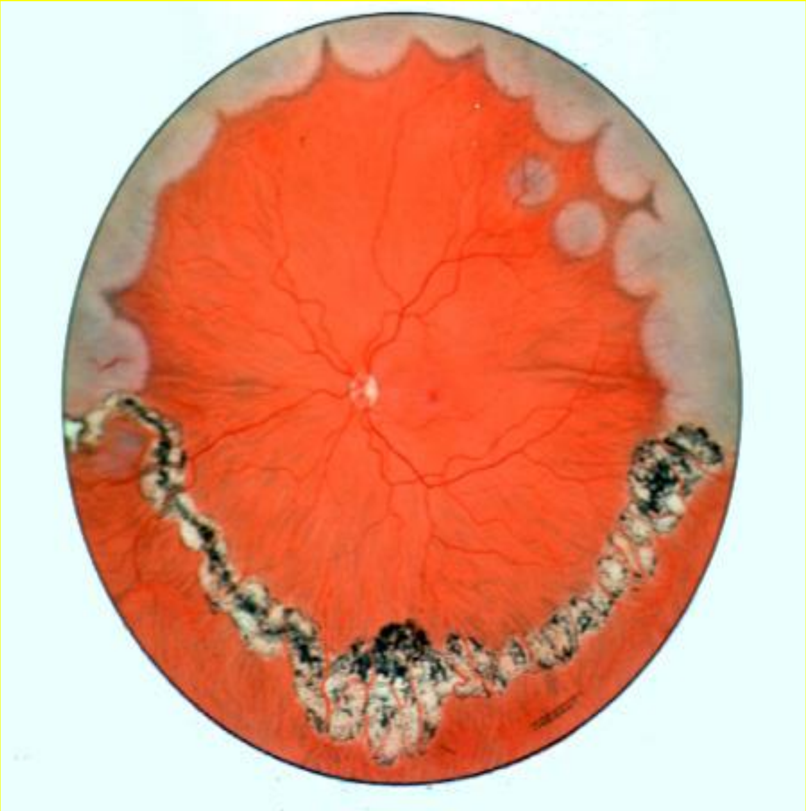


Surround lesion with two rows of confluent burns



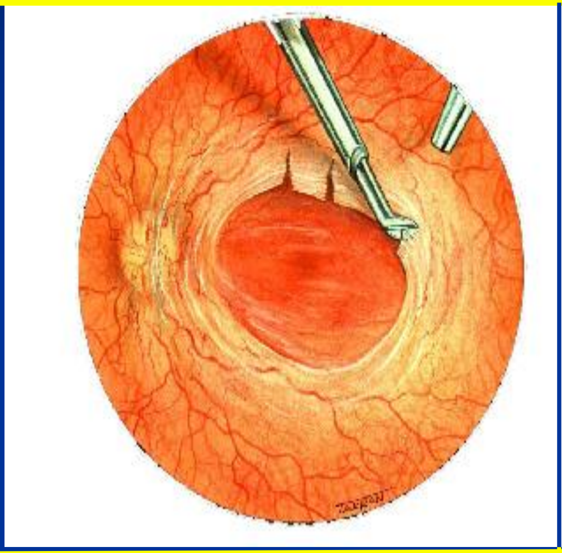
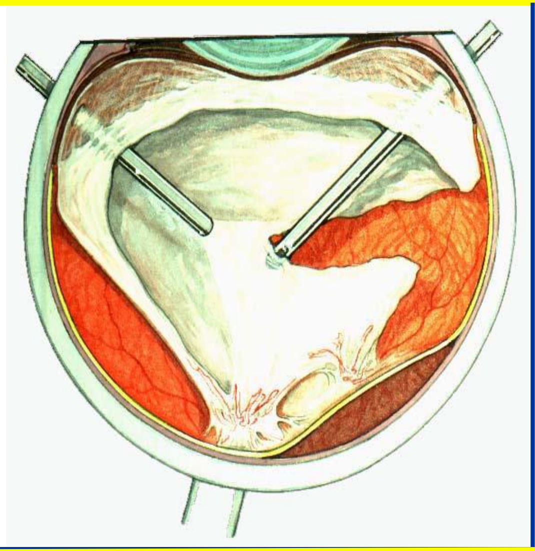
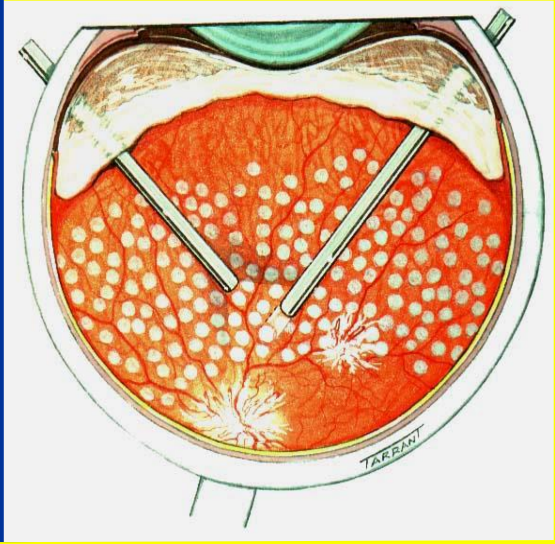
Difficult for anterior lesions and if media hazy

Cryotherapy

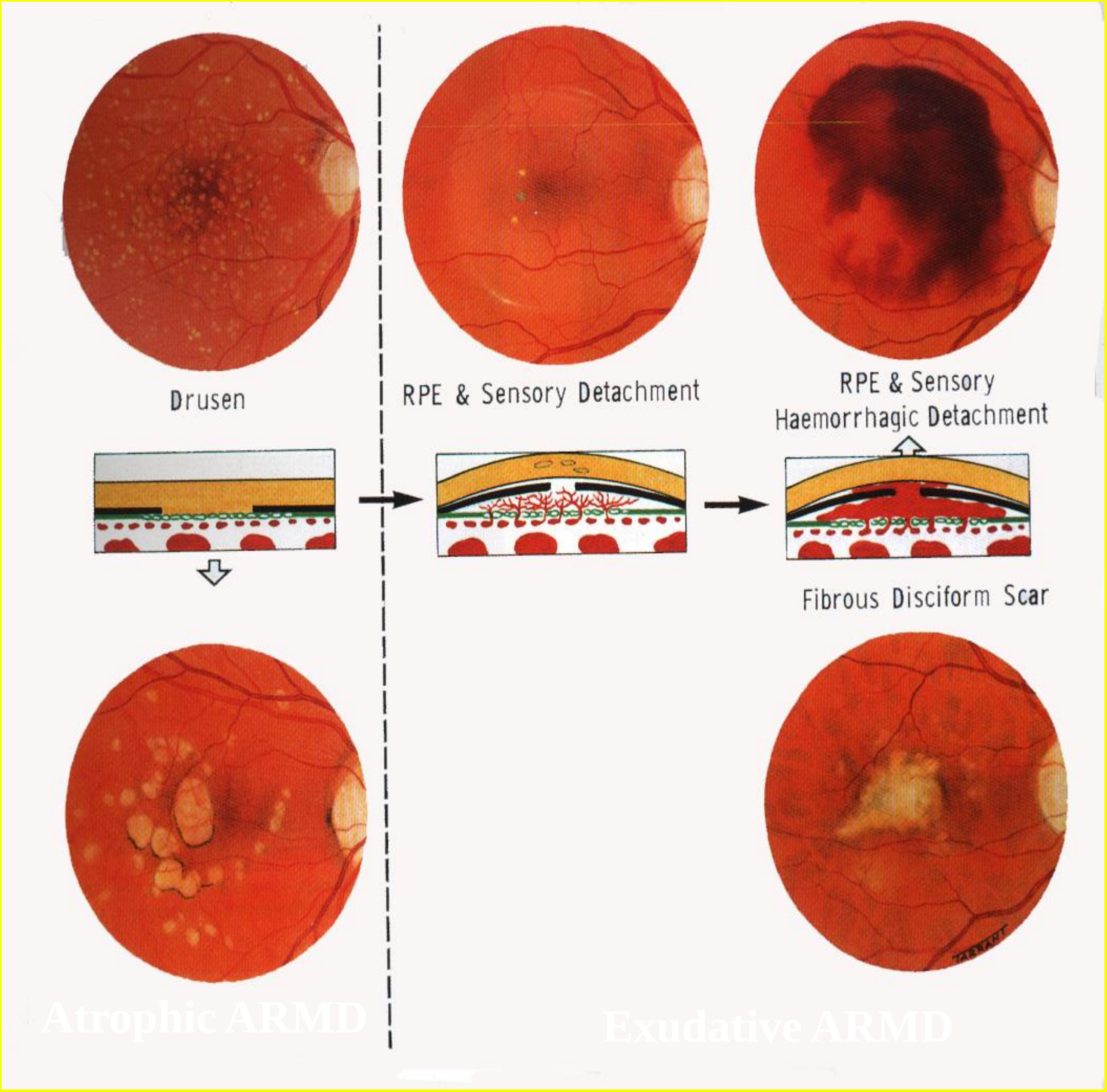


- Surround lesion with single row of cryo-applications
- Preferred for treatment of large areas

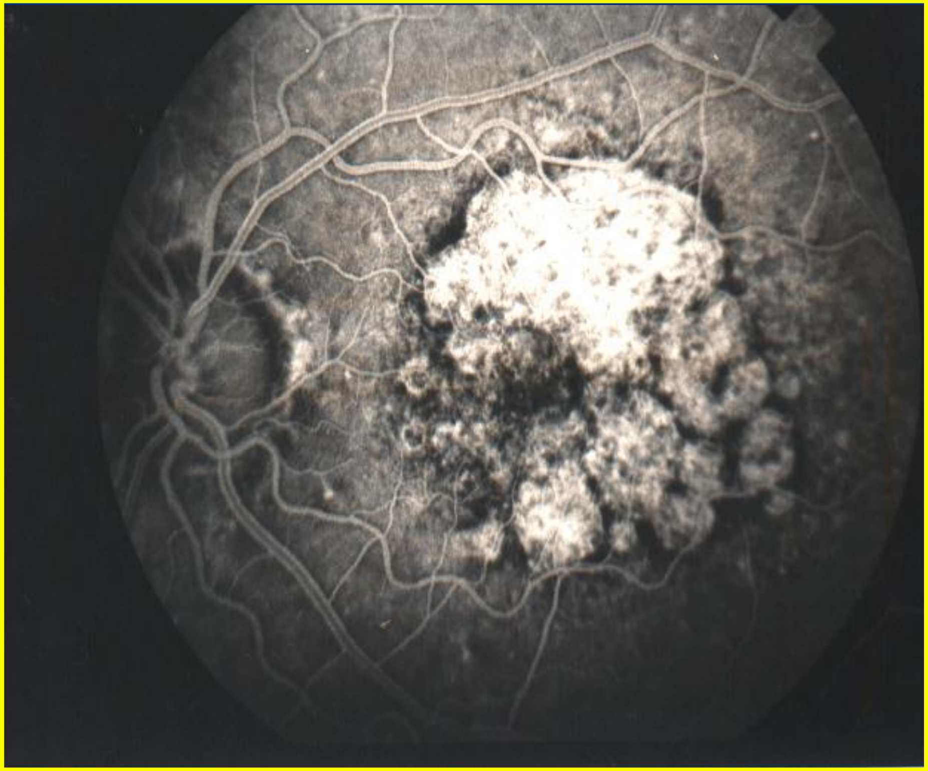
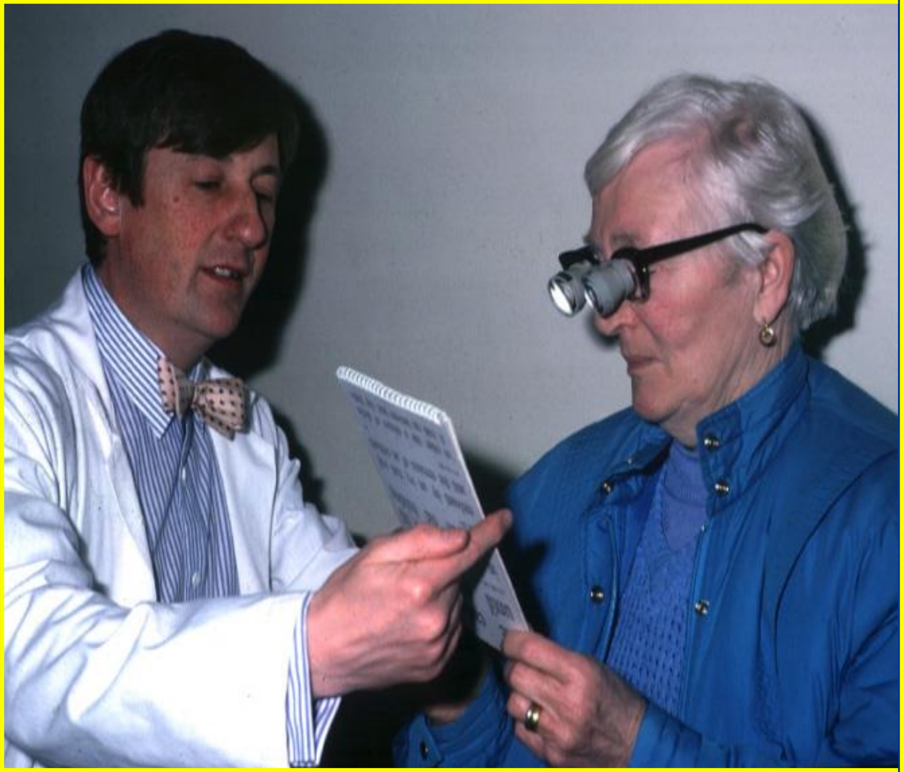
Vitrectomy and Endolaser

		
Release of circumferential traction	Release of antero-posterior traction	Endophotocoagulation

Age-Related Macular Degeneration

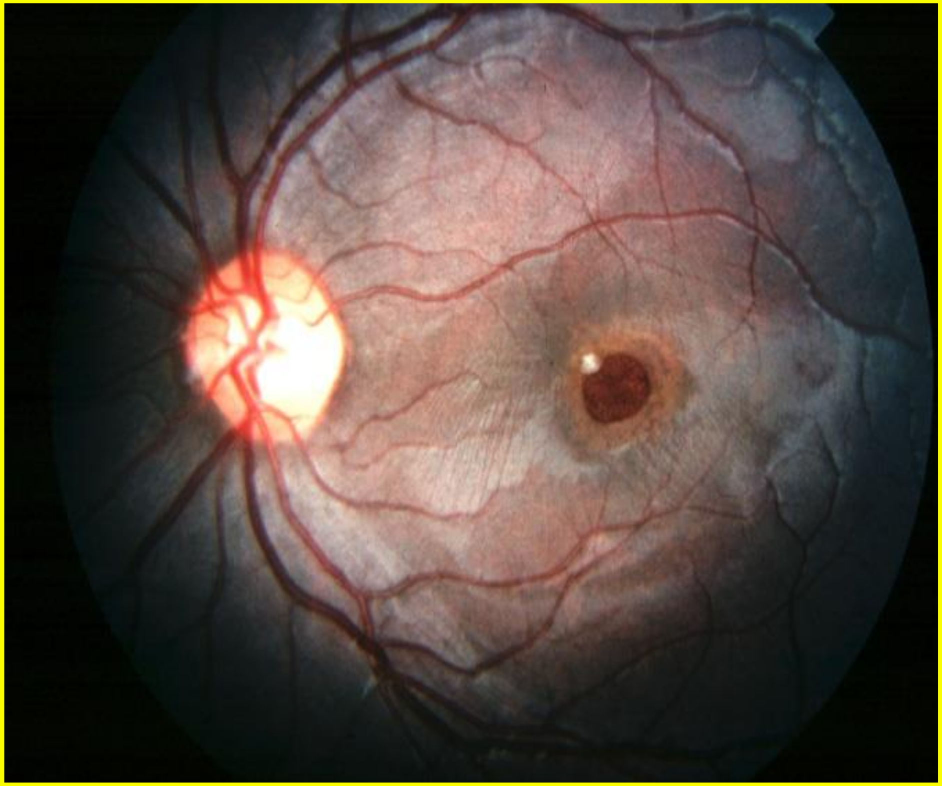

Drusen
RPE & Sensory Detachment
RPE & Sensory
Haemorrhagic Detachment
Fibrous Disciform Scar
TARRANT
Atrophic ARMD
Exudative ARMD

Age-related Macular Degeneration

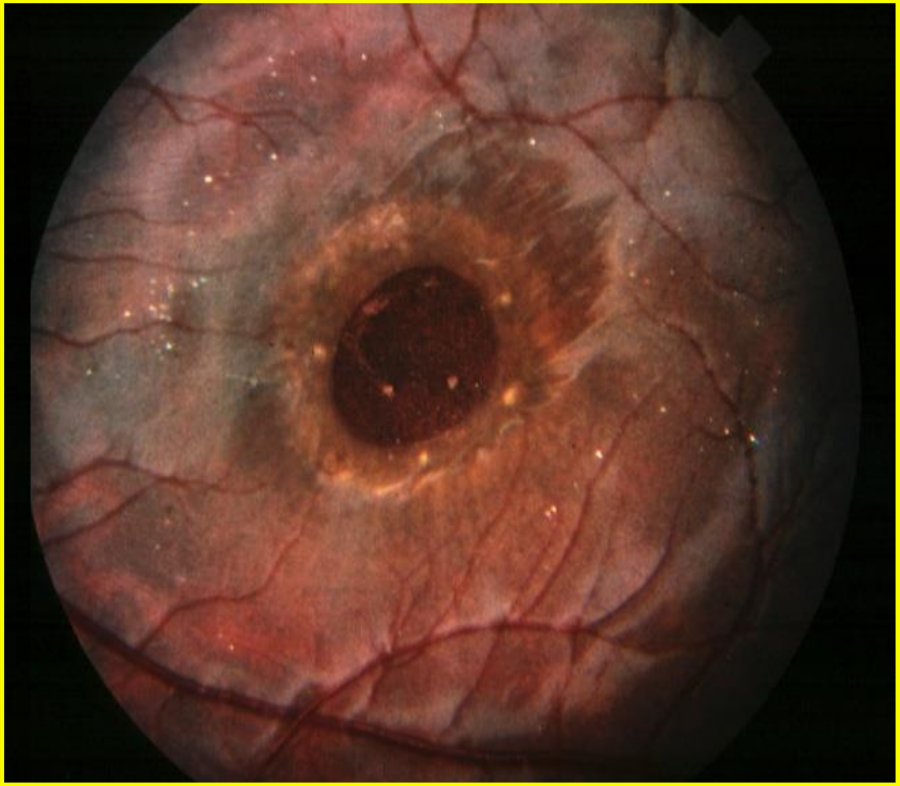
Fluorescein angiogram	Management
	
Hyperfluorescence	Low-vision aids if appropriate

Clinical features of full-thickness macular hole

- Typically affects elderly females
- Eventually bilateral in 10%

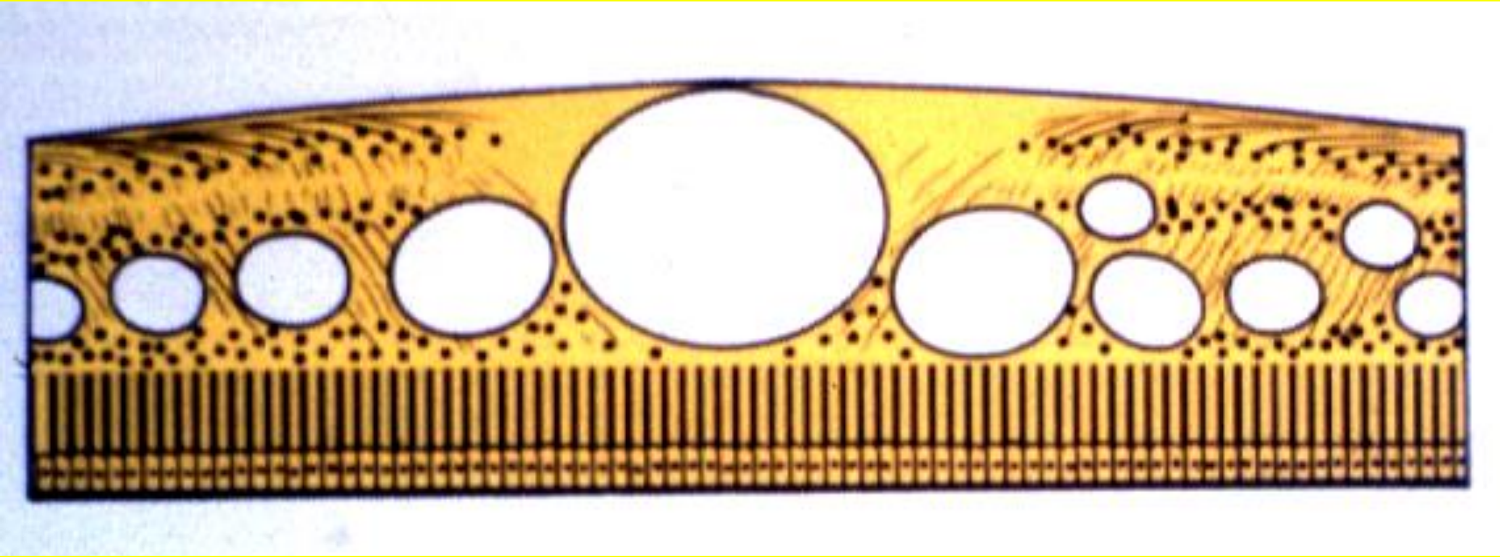


- Round punched-out area at fovea
- Surrounding halo of sub-retinal fluid

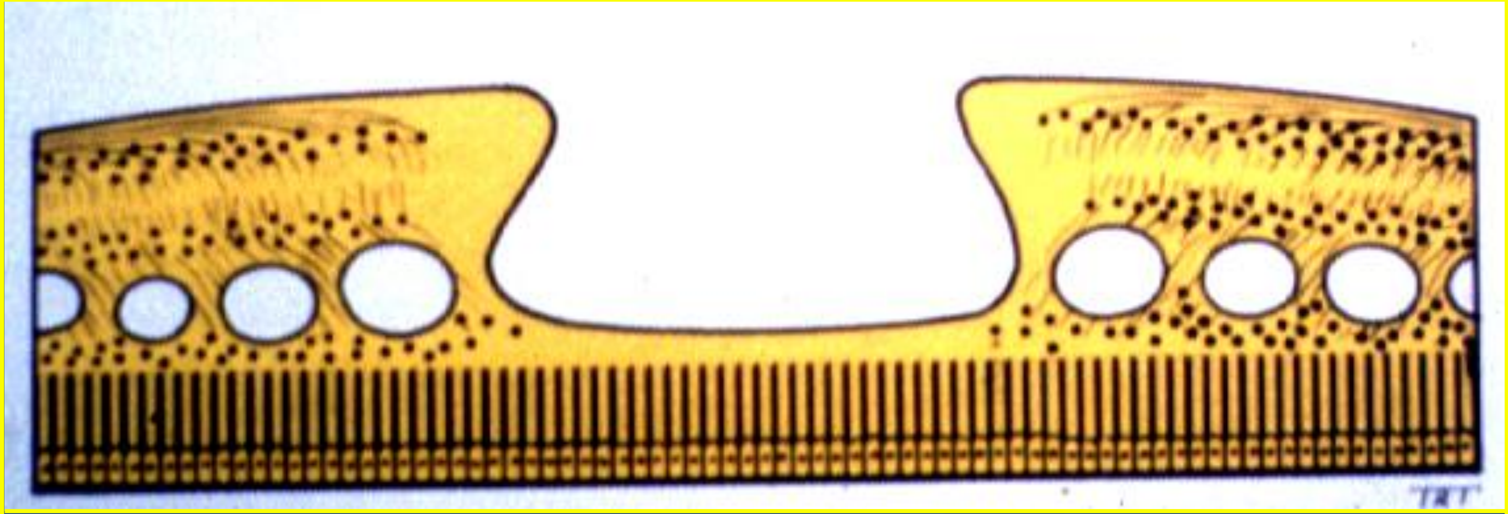


Multiple yellow deposits within crater

Cystoid macular oedema (CMO)

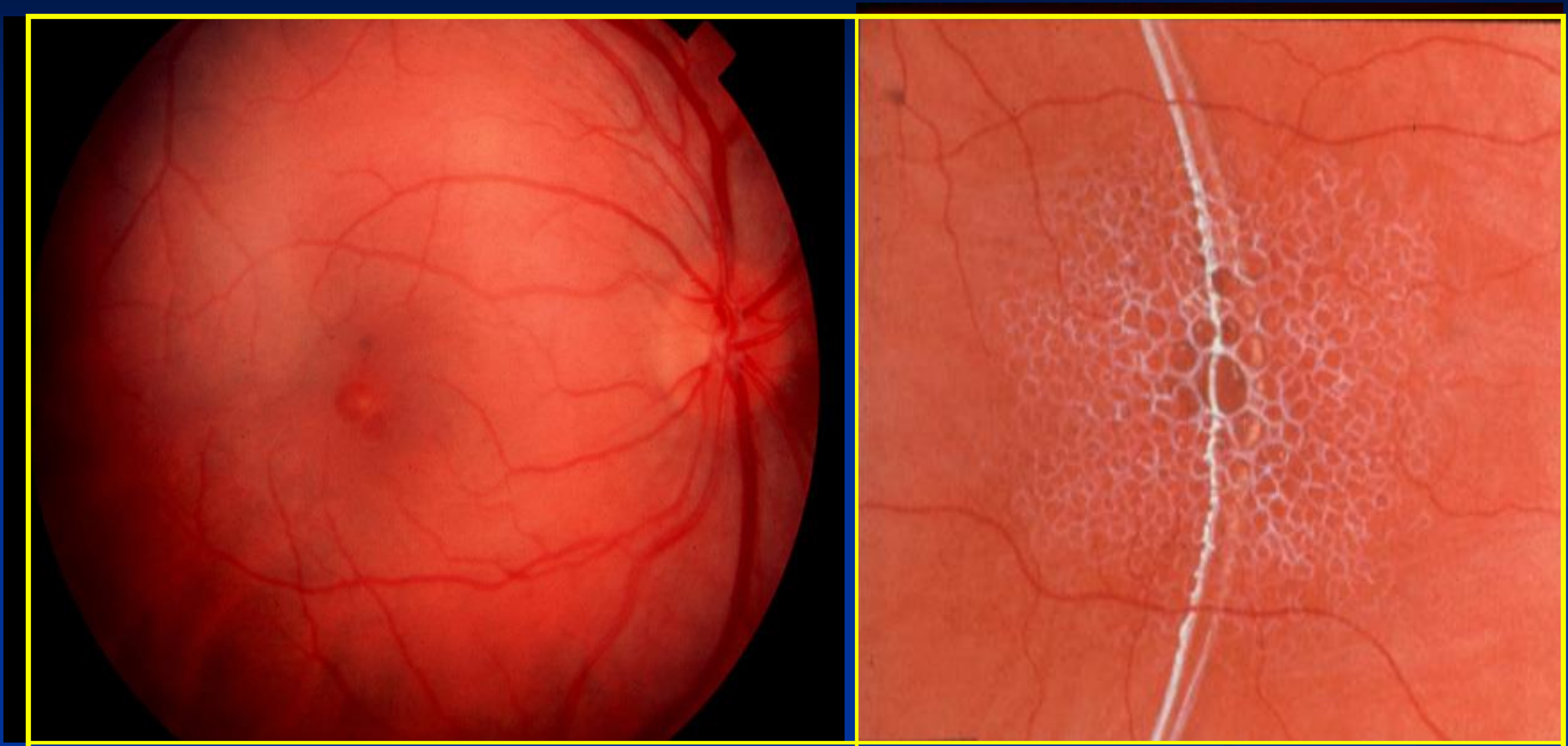


Fluid-filled microcysts in outer plexiform and inner nuclear layer



May lead to lamellar hole formation if longstanding

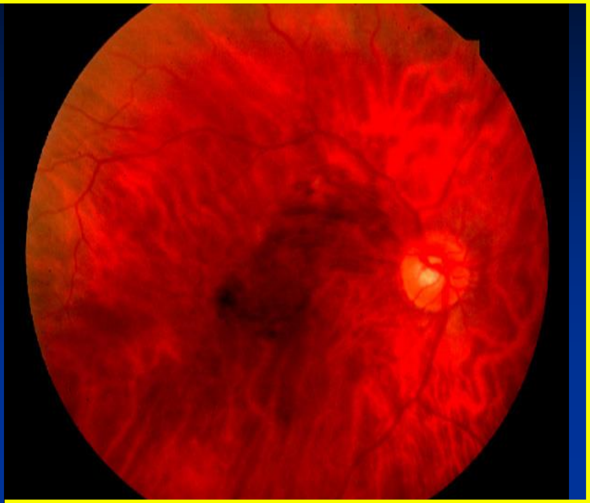
Clinical diagnosis of CMO



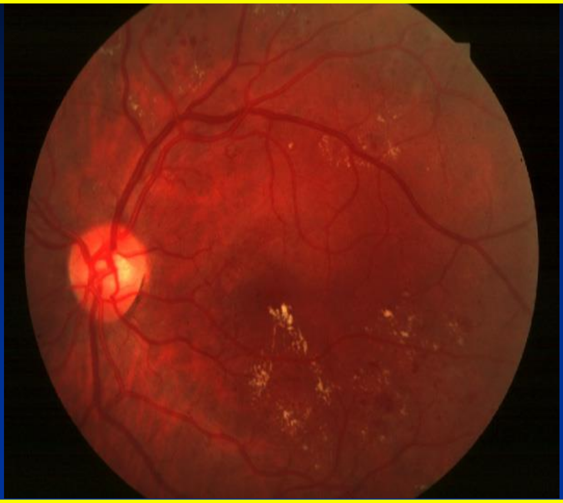
- Loss of foveal depression
- Yellow spot at foveola

- Retinal thickening
- Multiple cystoid areas

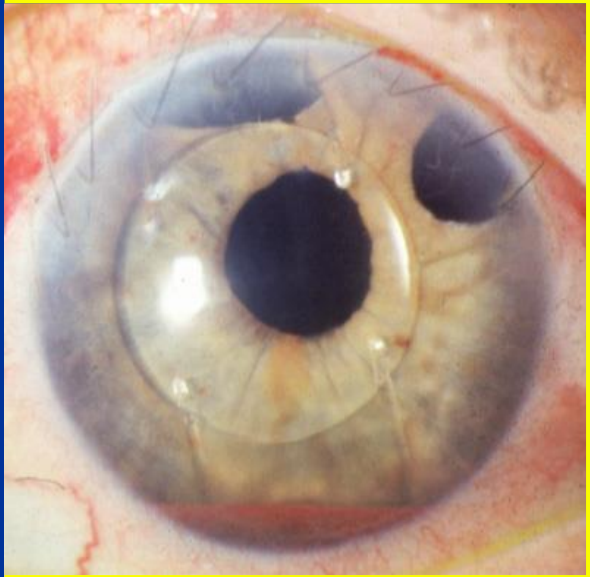
Important causes of CMO



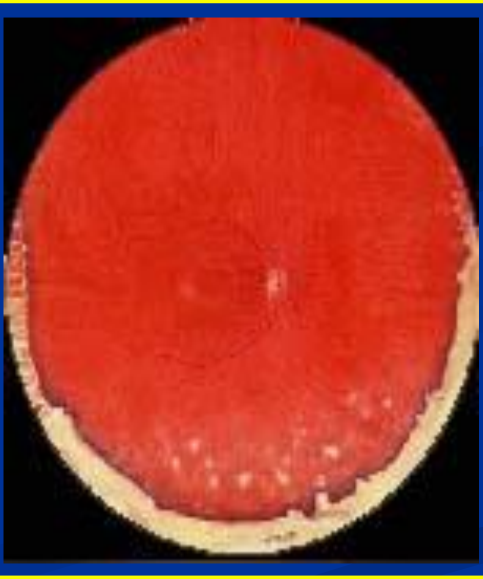
Retinal vein occlusion



Background diabetic retinopathy

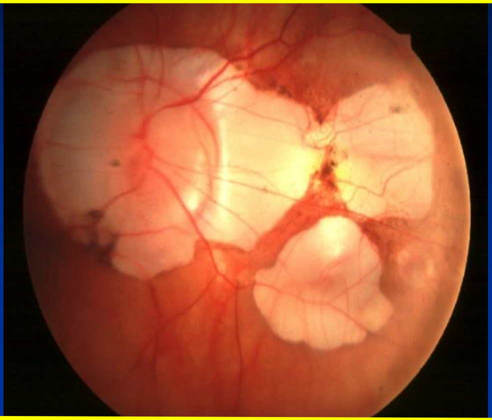
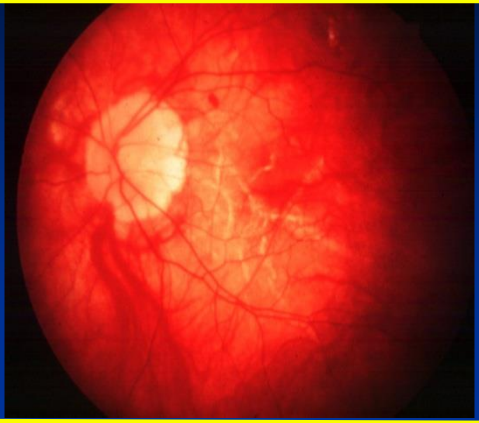
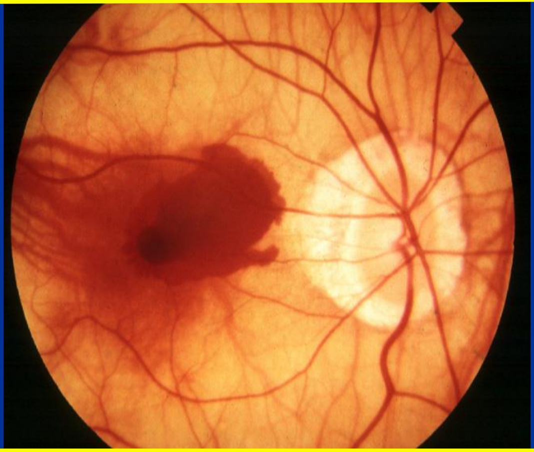
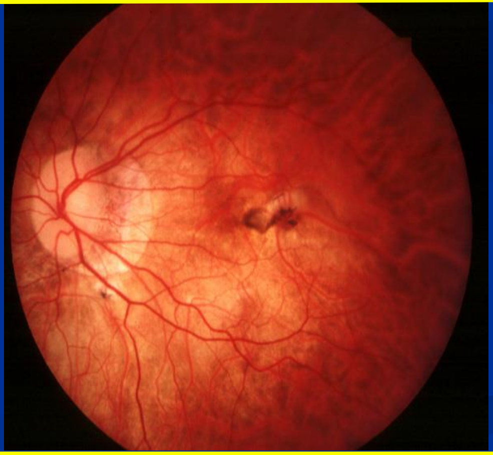


Post-cataract surgery

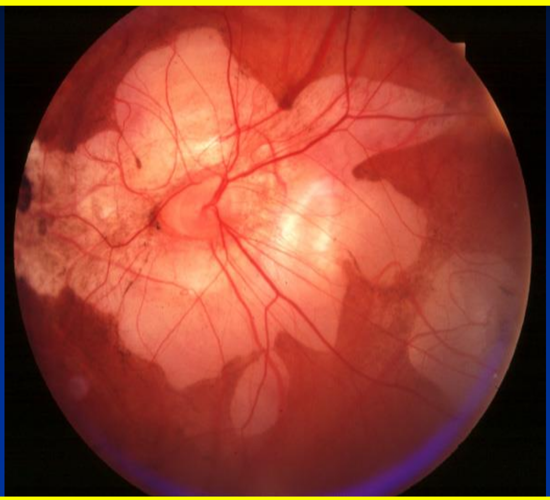


Intermediate uveitis

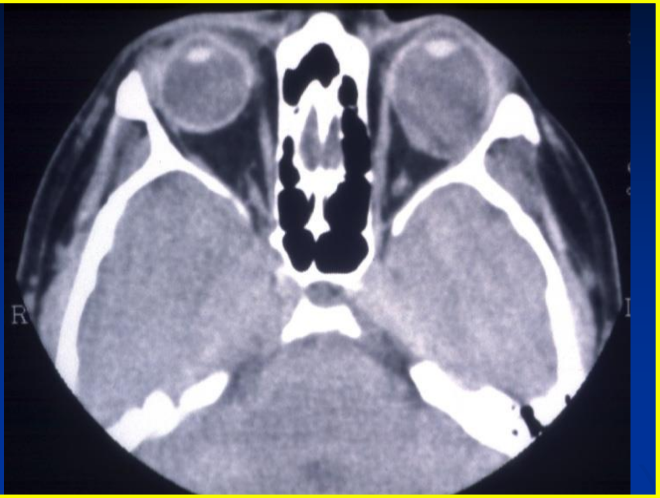
Myopic maculopathy

Atrophic	‘Lacquer cracks’
	
Progressive chorioretinal atrophy May be associated with macular hole	Large breaks in Bruch membrane Develop in about 5% of highly myopic eyes
Macular haemorrhage	**Fuchs spot**
	
• From CNV with lacquer cracks • From lacquer cracks alone	• Secondary pigment proliferation • Follows absorption of blood

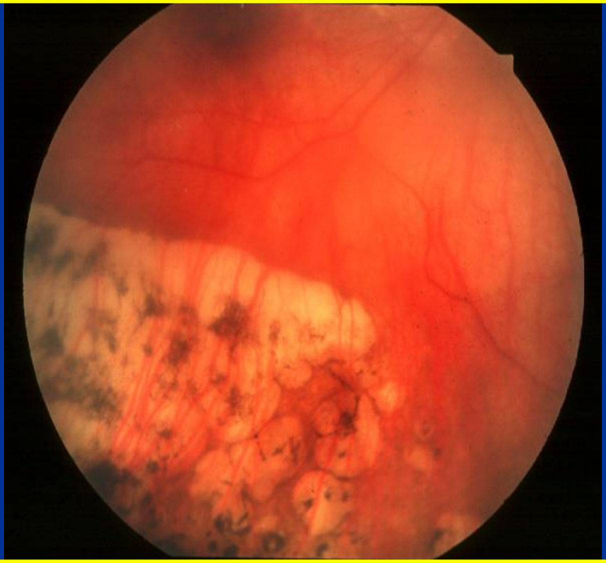
Other fundus changes in myopia



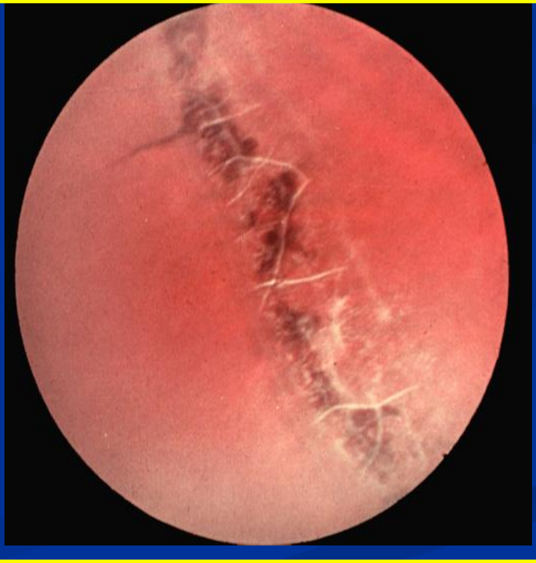
Tilted disc



Posterior staphylomas



Peripheral chorioretinal degeneration



Lattice degeneration, holes and retinal detachment

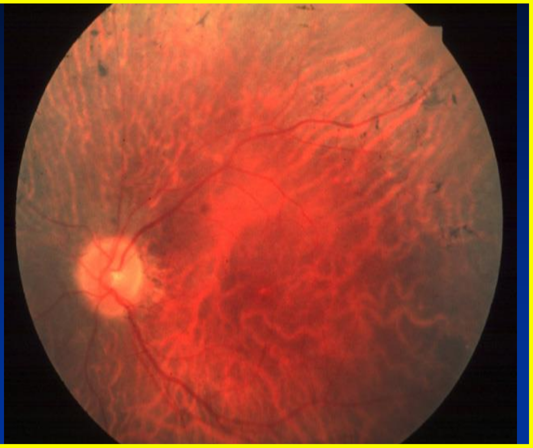
Retinitis Pigmentosa

1. **Inheritance**
   - Sporadic (23%)
   - Dominant (43%)
   - Recessive (20%)
   - X-linked recessive (8%)
   - Uncertain (6%)
2. **Presents** - usually prior to 30 years

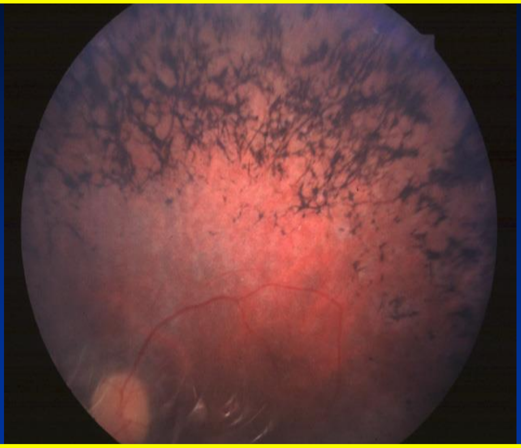
3. **Prognosis** - dominant worst, x-linked best

4. **ERG** - reduced

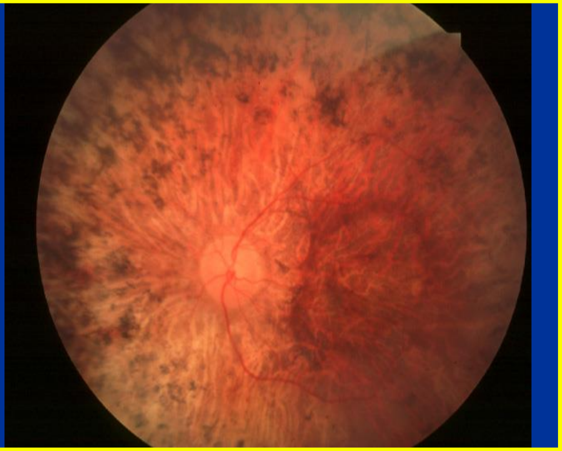
Progression of Retinitis Pigmentosa



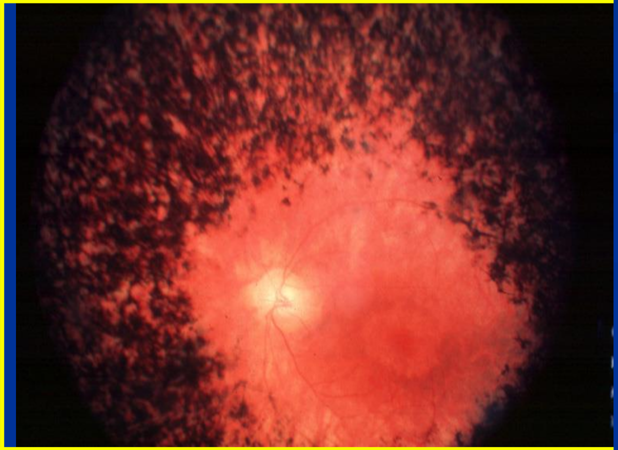
- Fine dust-like pigmentation
- Arteriolar attenuation



- ‘Bone-spicule’ pigmentation



- Unmasking of large choroidal vessels



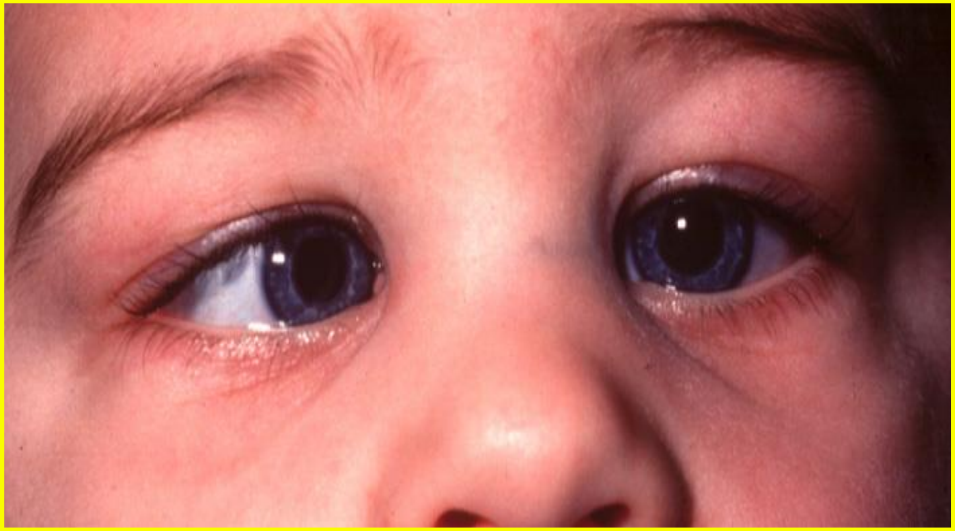
- Optic disc pallor
- Maculopathy

SQUINT

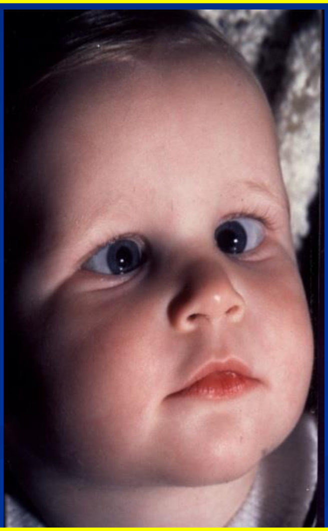
Essential infantile esotropia

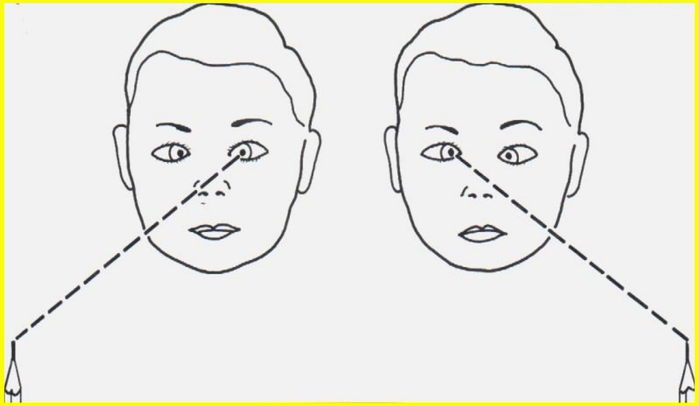
Presents within first 6 months

Signs



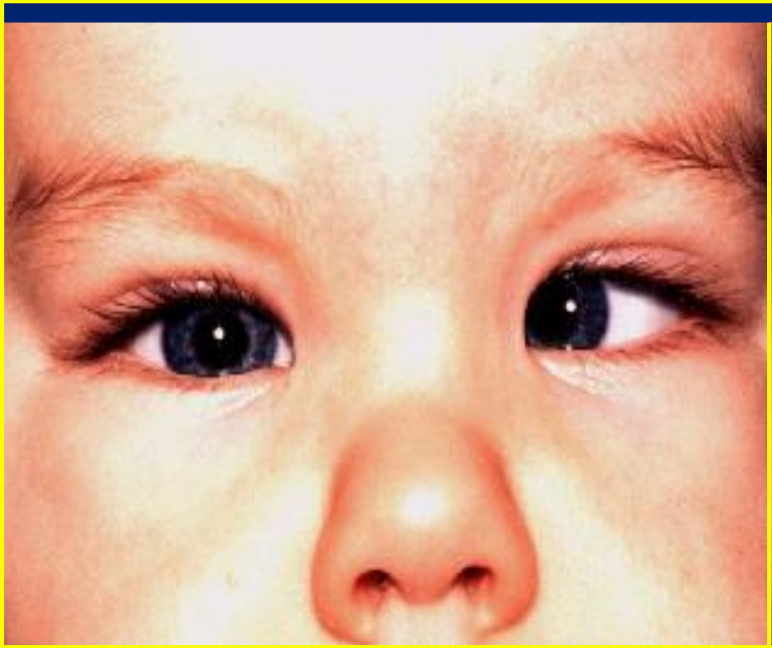
- Angle large and stable
- Nystagmus in some cases
- Normal refraction for age
- Poor potential for BSV
- Amblyopia in about 30%



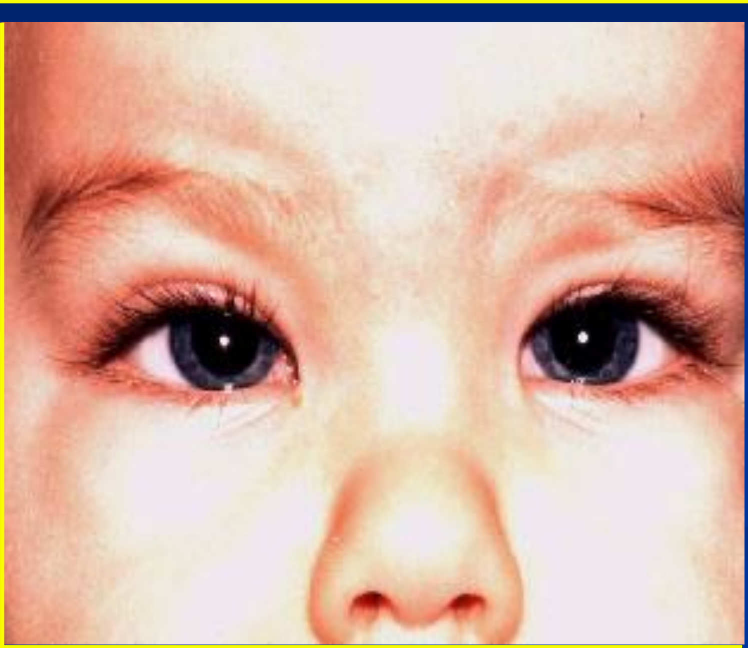


- Cross fixation

Management of essential infantile esotropia

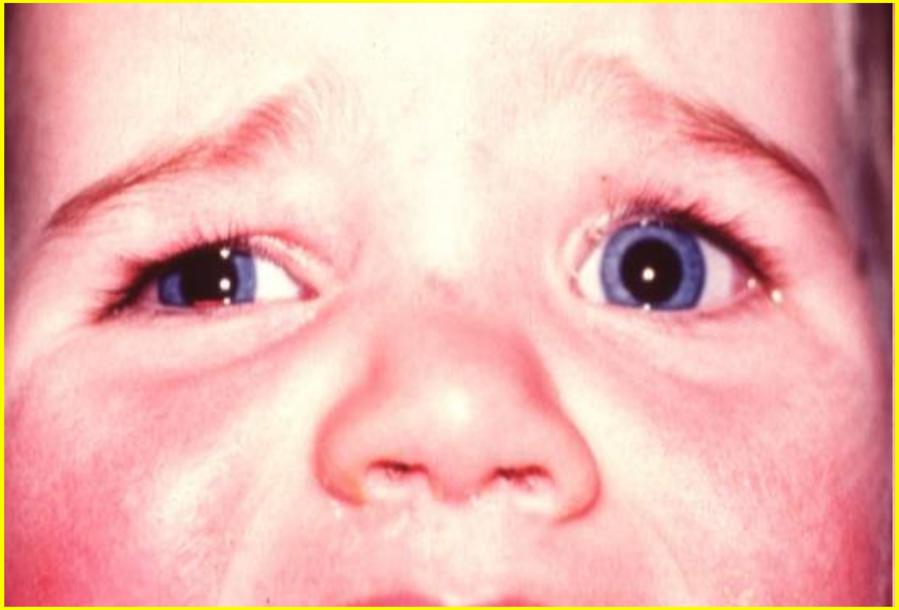
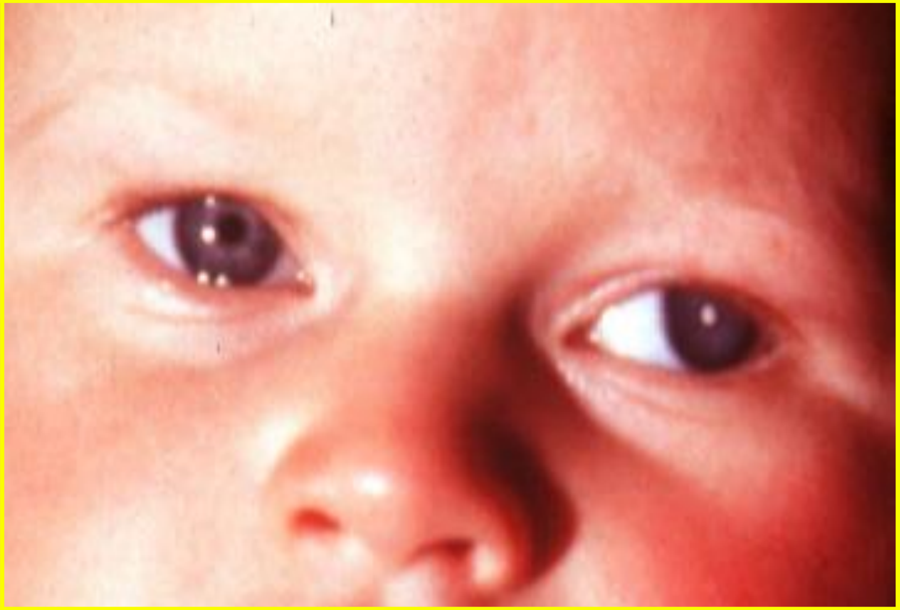


- Correct amblyopia if present
- Surgery before age 12 months



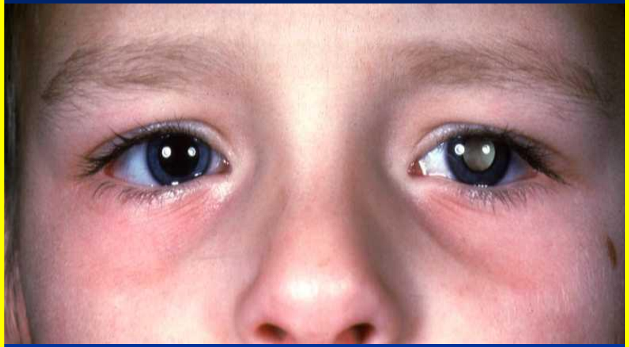
- Bilateral medial rectus recessions

Constant exotropia

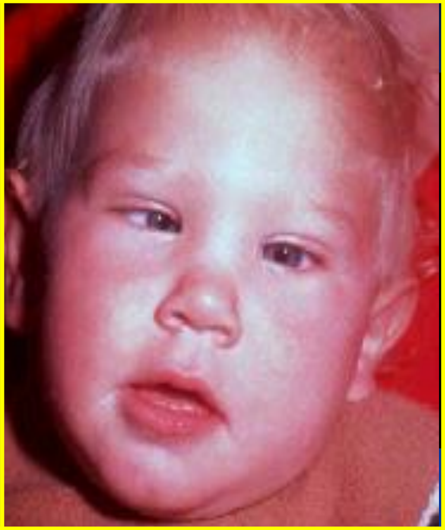
Congenital	Sensory
	
• Presents at birth • Large angle • Alternating fixation • Normal refraction for age	• Disruption of binocular reflexes by acquired lesions, such as cataract

Consecutive - follows previous surgery for esotropia

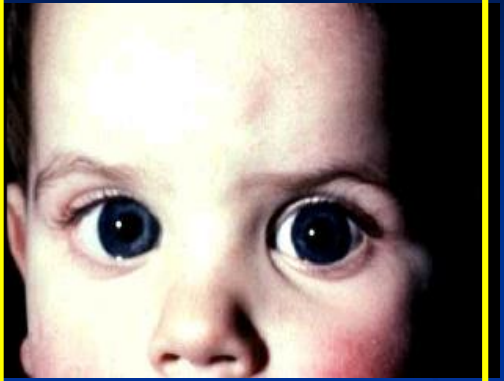
Presentations of retinoblastoma



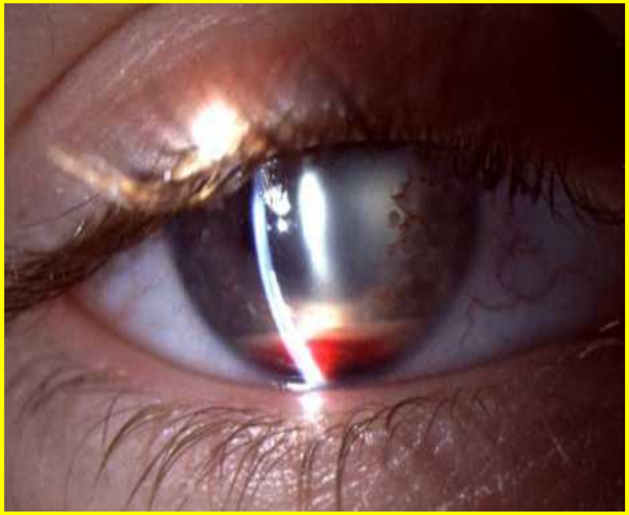
- Leukocoria - 60%



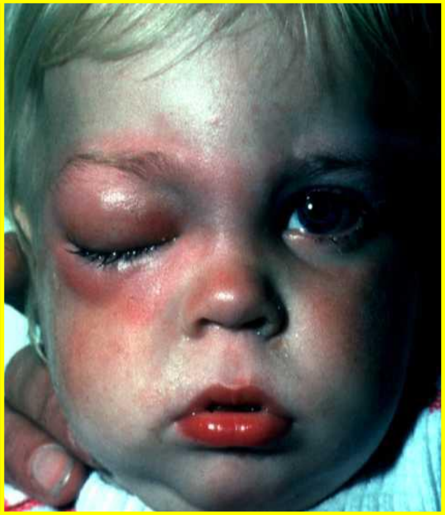
- Strabismus - 20%



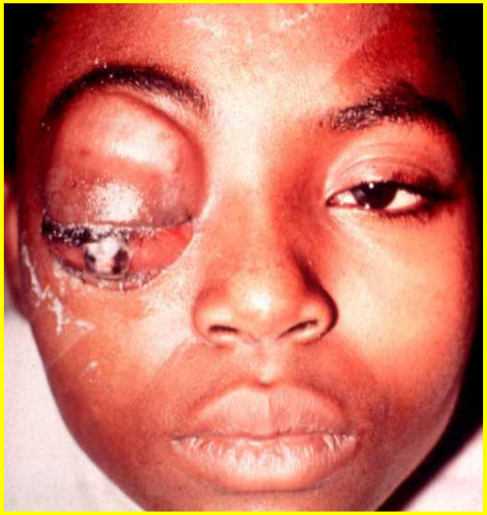
- Secondary glaucoma



- Anterior segment invasion

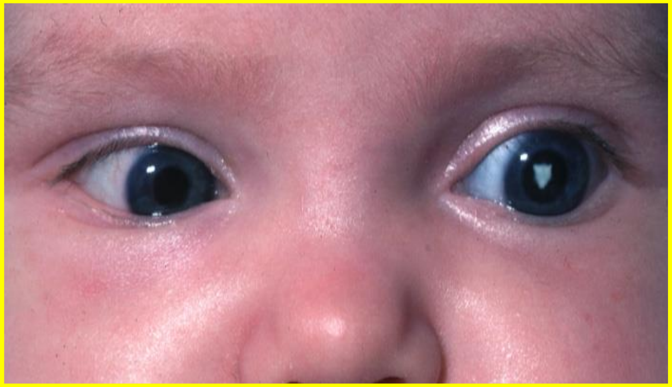
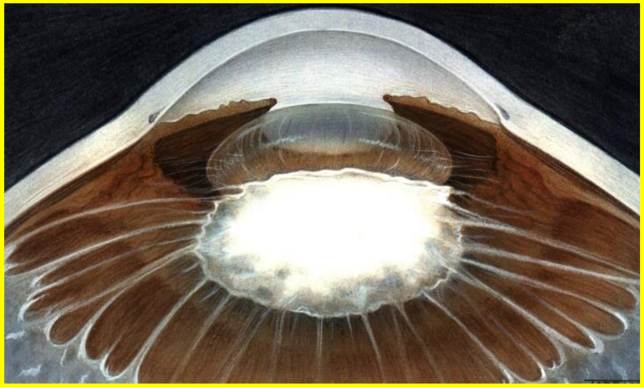
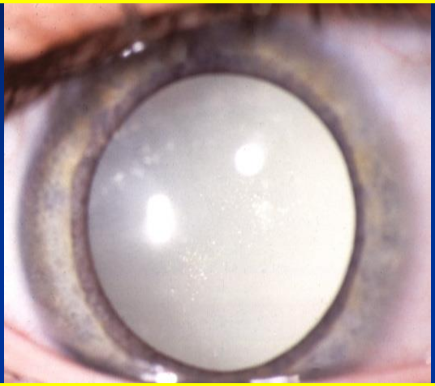
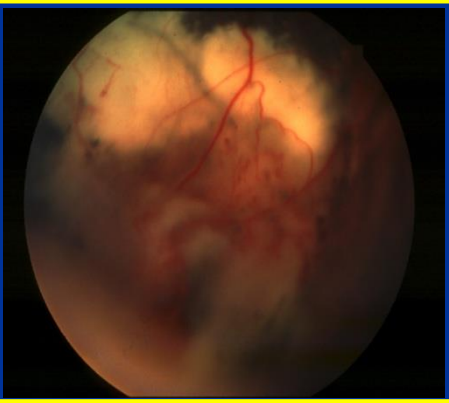
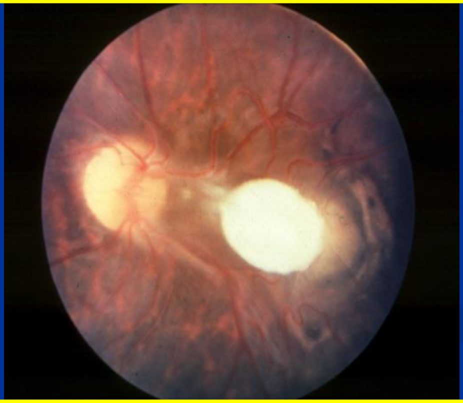
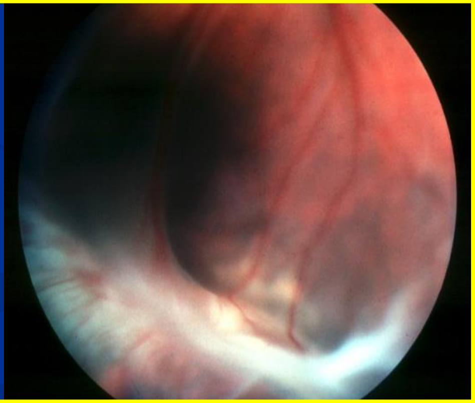


- Orbital inflammation



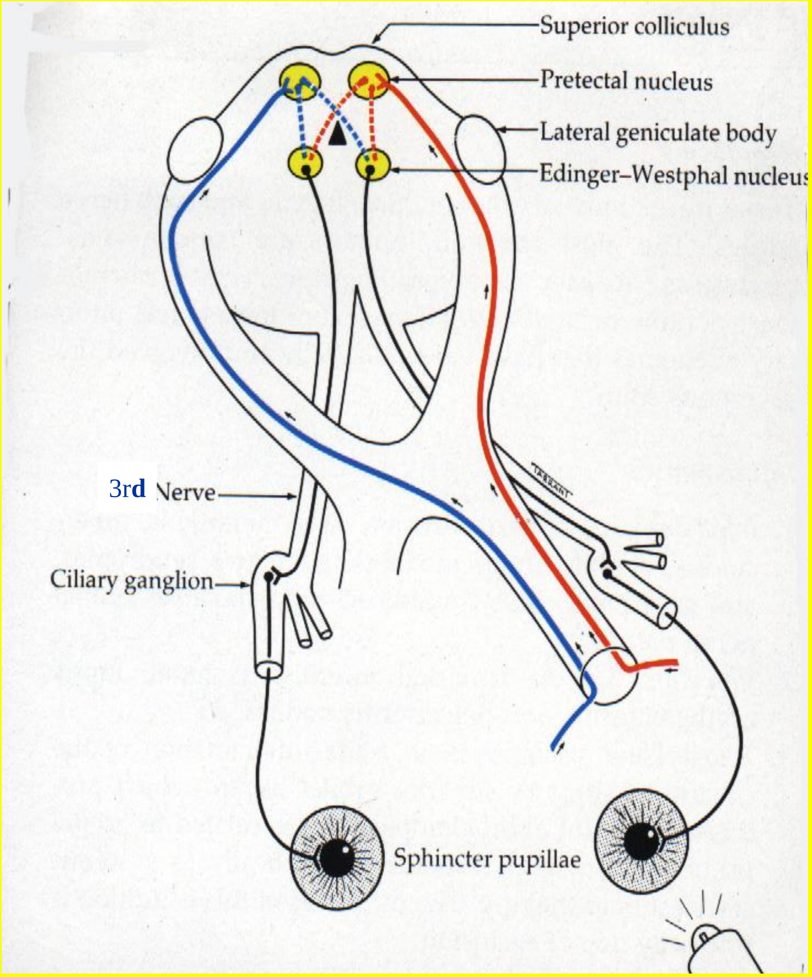
- Orbital invasion

Differential diagnosis of leukocoria

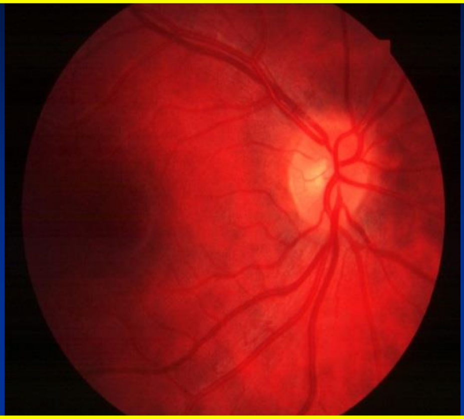
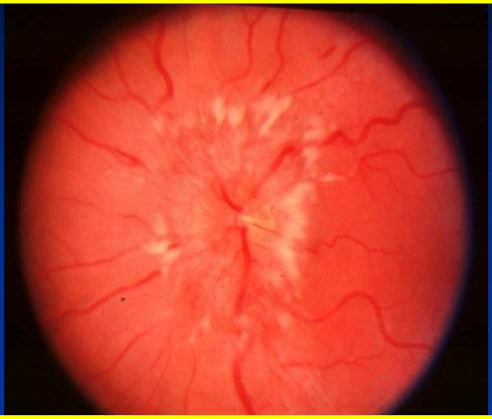
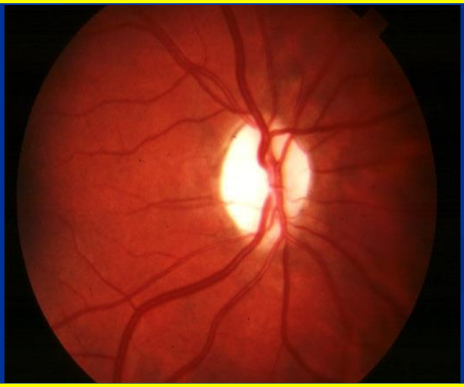
Congenital cataract	**Persistent hyperplastic primary vitreous**	**Inflammatory cyclitic membrane**
		
Unilateral or bilateral	**Unilateral**	**Unilateral or bilateral**
Coats disease	**Posterior pole toxocara granuloma**	**Advanced retinopathy of prematurity**
		
Unilateral	**Unilateral**	**Always bilateral but may be asymmetrical**

NEURO-OPHTHALMOLOGY

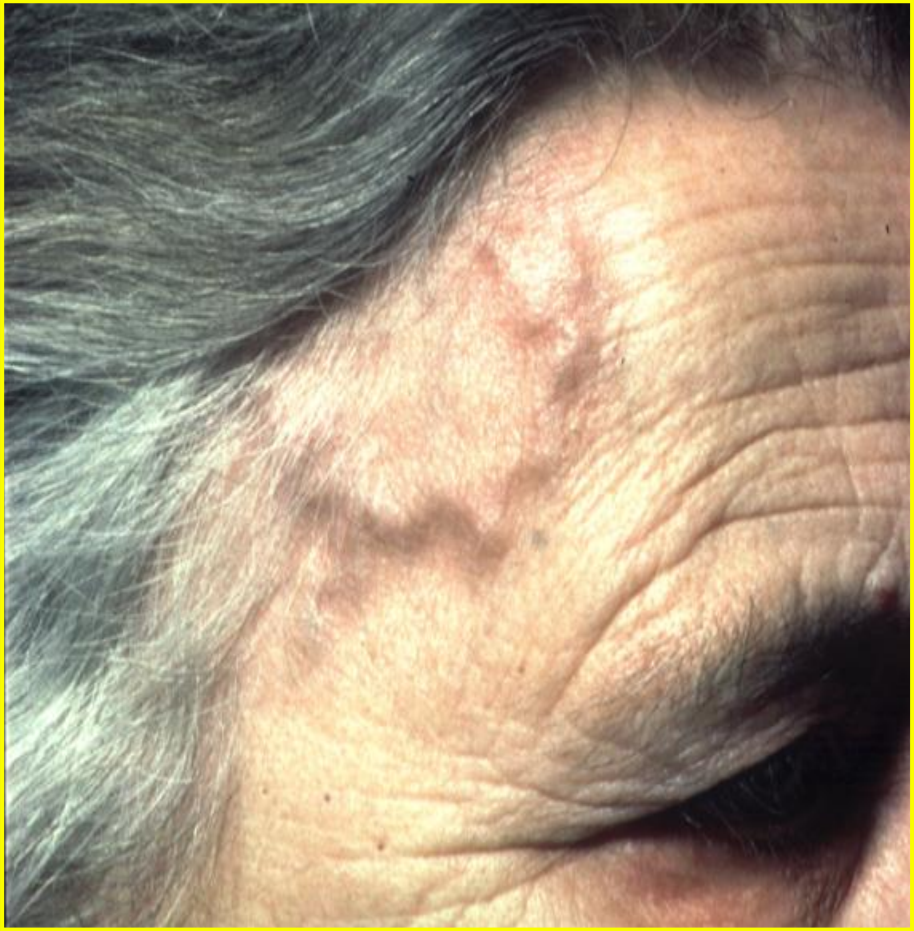
Applied anatomy of afferent conduction defect

Anatomical pathway	Signs
 Superior colliculus Pretectal nucleus Lateral geniculate body Edinger–Westphal nucleus 3rd Nerve Ciliary ganglion Sphincter pupillae	• Equal pupil size • Light reaction - ipsilateral direct is absent or diminished - consensual is normal • Near reflex is normal in both eyes • Total defect (no PL) = amaurotic pupil • Relative defect = Marcus Gunn pupil

Optic disc changes

Normal	Swelling
	
- Retrobulbar neuritis - Early compression	- Papilloedema - Papillitis and neuroretinitis - AION
	Atrophy
	
	- Postneuritic - Compression - Hereditary optic atrophies

Superficial temporal arteritis



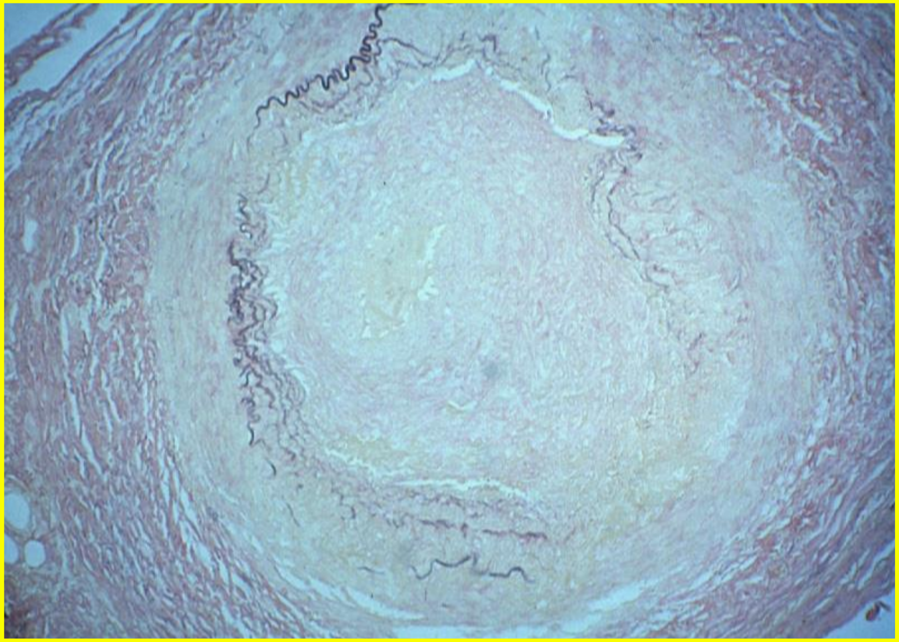
Presentation

- Age - 65-80 years
- Scalp tenderness
- Headache
- Jaw claudication
- Polymyalgia rheumatica
- Superficial temporal arteritis
- Acute visual loss

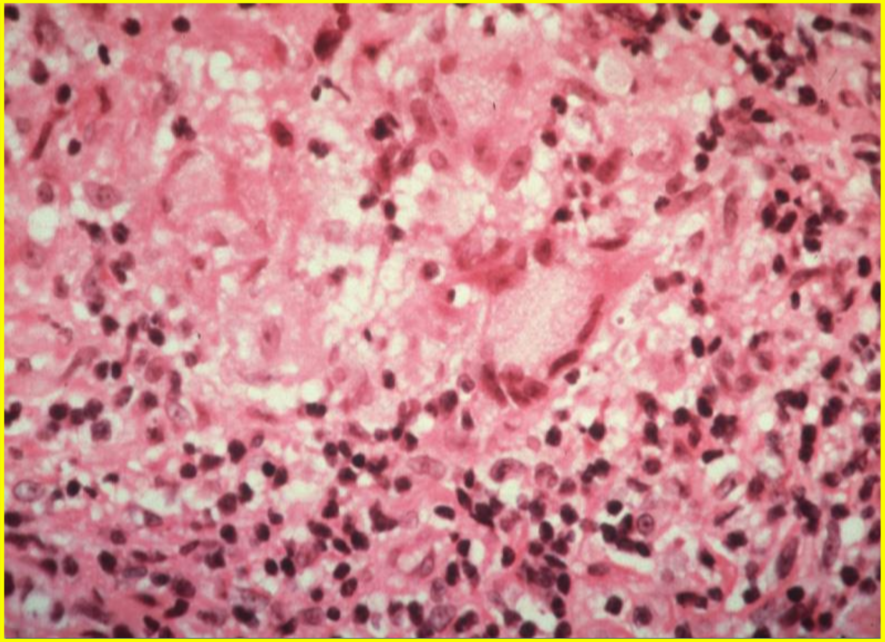
Special investigations

- ESR - often > 60, but normal in 20%
- C-reactive protein - always raised
- Temporal artery biopsy

Histology of giant cell arteritis

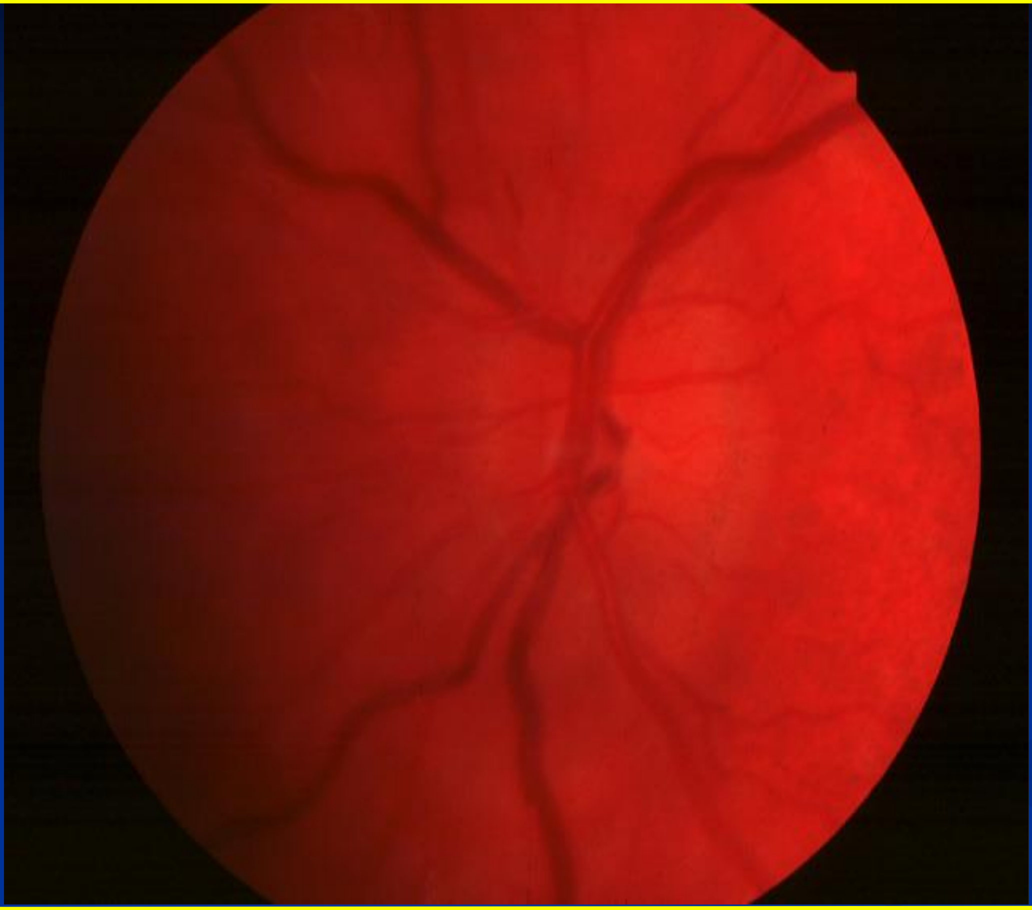


- Granulomatous cell infiltration
- Disruption of internal elastic lamina
- Proliferation of intima
- Occlusion of lumen



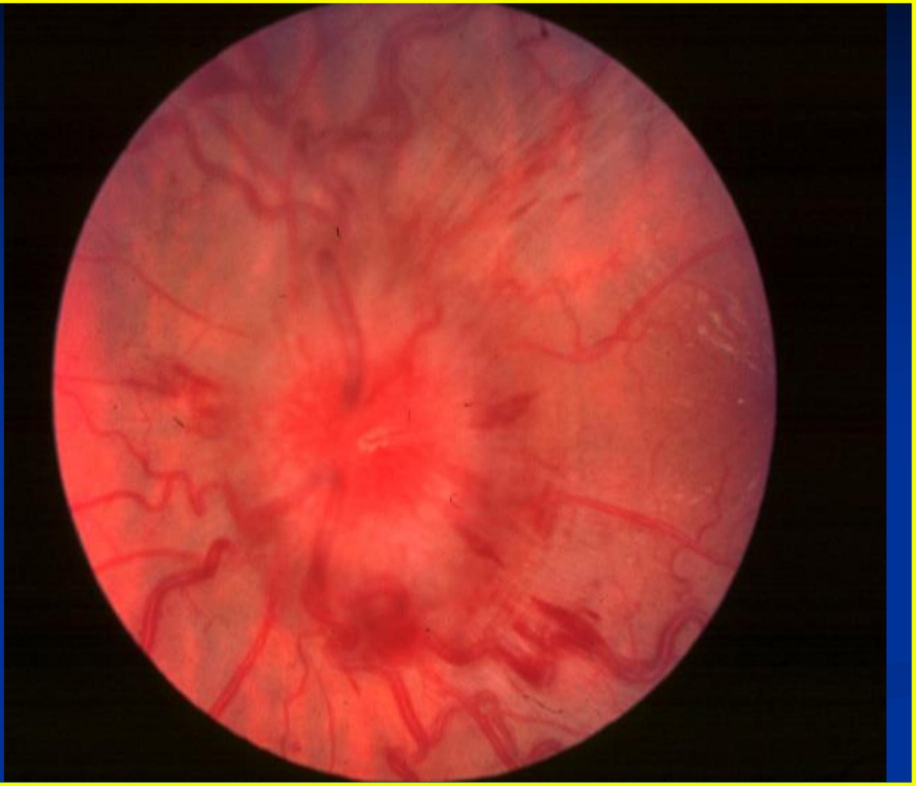
- High-magnification shows giant cells

Early Papilloedema



- VA - normal
- Mild disc hyperaemia
- Indistinct disc margins - initially nasal
- Mild venous engorgement
- Normal optic cup

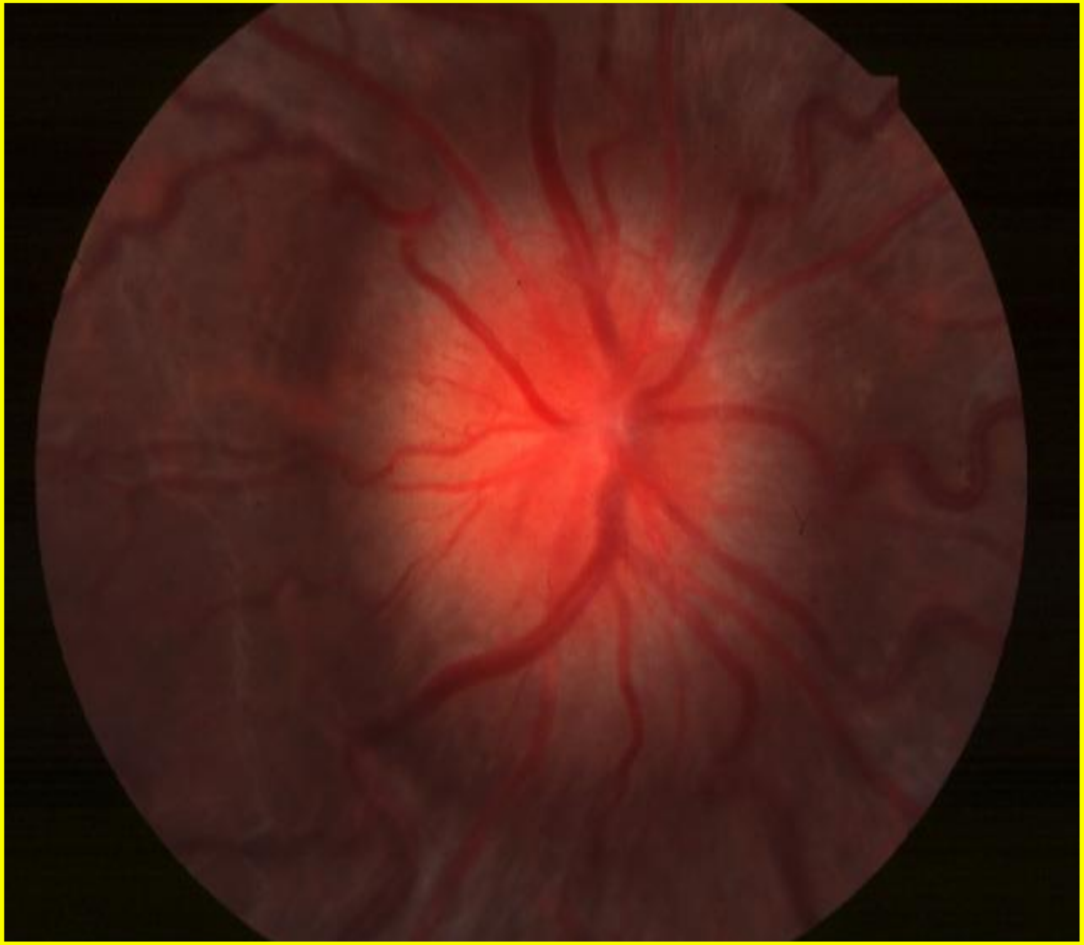
Established Papilloedema (acute)



- VA - usually normal
- Severe disc elevation and hyperaemia
- Very indistinct disc margins
- Obscuration of small vessels on disc
- Marked venous engorgemenT

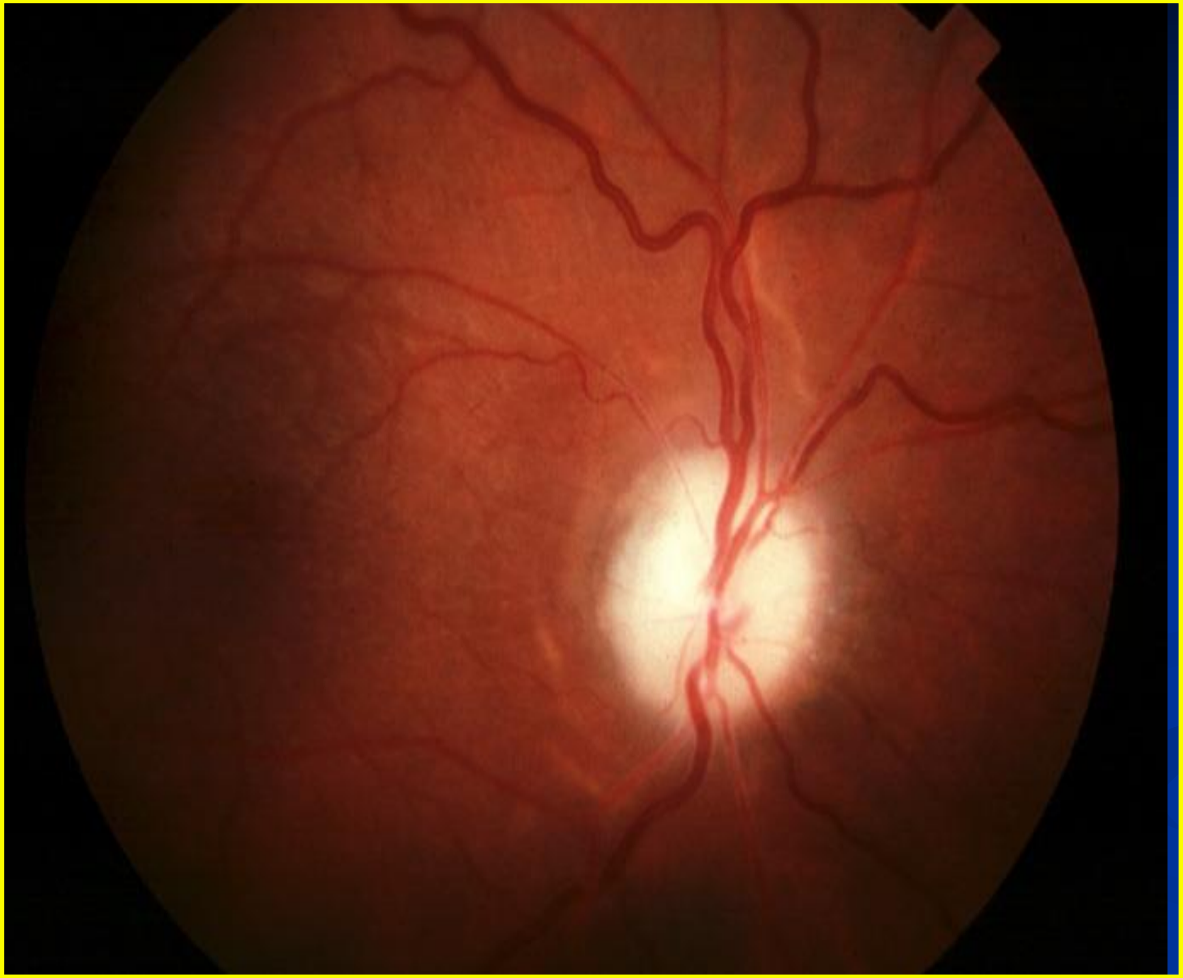
–

Longstanding Papilloedema (chronic)



- VA - variable
- Marked disc elevation but less hyperaemia
- Disc margins - indistinct
- Variable venous engorgement
- Absent optic cup

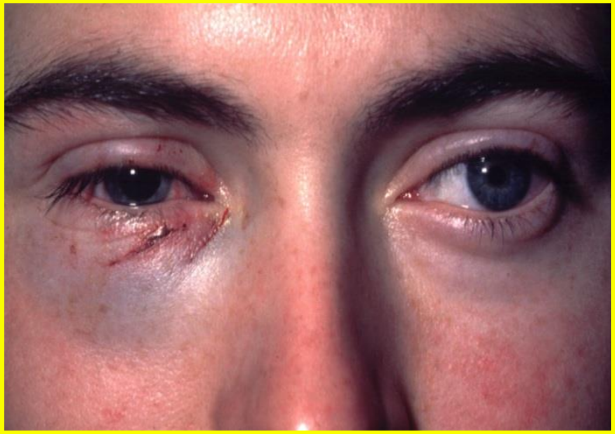
Atrophic papilloedema (secondary optic atrophy)



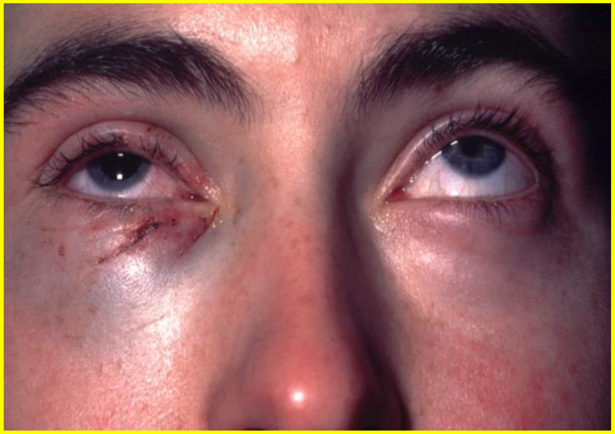
- VA - severely decreased
- Mild disc elevation
- Indistinct disc margins
- Disc pallor with few crossing vessels
- Absent optic cup

OCULAR TRAUMA

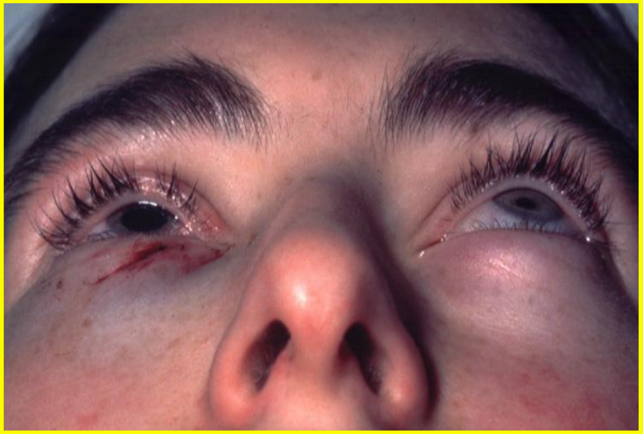
Orbital floor blow-out fracture



- Periocular ecchymosis and oedema
- Infraorbital nerve anaesthesia



- Ophthalmoplegia - typically in up- and down-gaze (double diplopia)

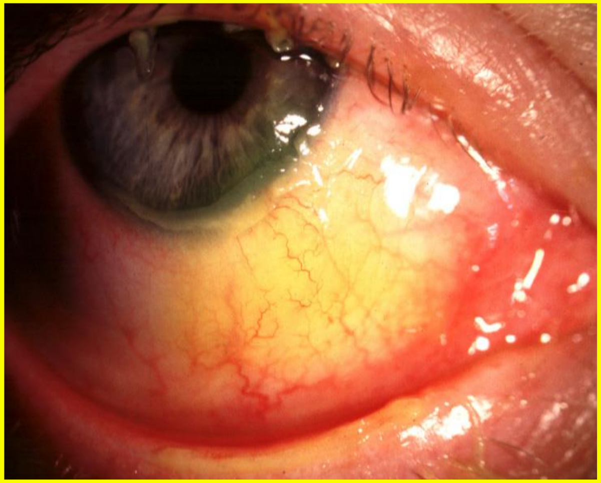
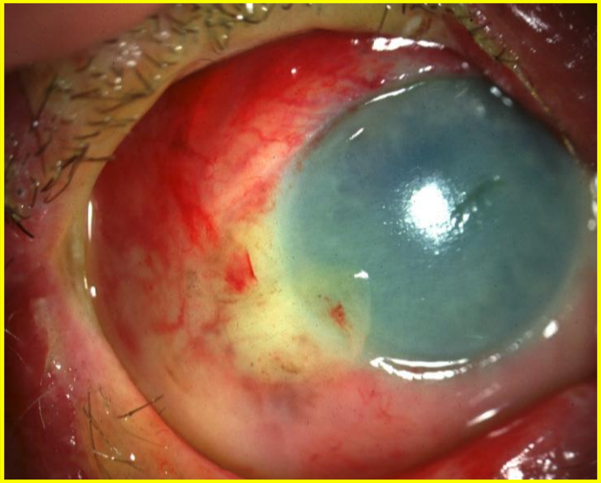
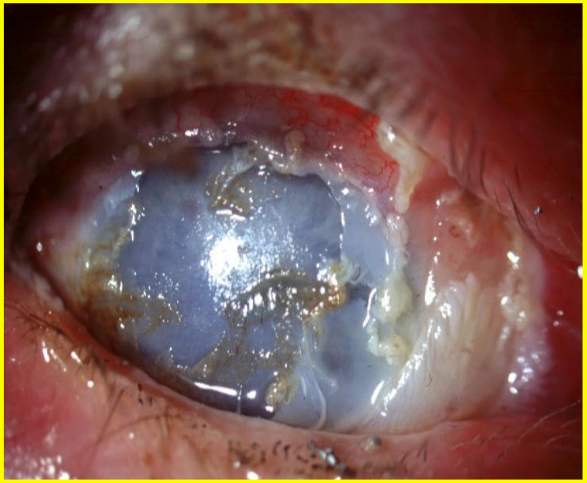


- Enophthalmos - if severe

Grading of severity of chemical injuries

Grade I (excellent prognosis)

- Clear cornea
- Limbal ischaemia - nil

Grade II (good prognosis)	Grade III (guarded prognosis)	Grade IV (very poor prognosis)
		
• Cornea hazy but visible iris details • Limbal ischaemia < 1/3	• No iris details • Limbal ischaemia – 1/3 to 1/2	• Opaque cornea • Limbal ischaemia > 1/2

Medical Treatment of Chemical Injuries

1. **Copious irrigation (15-30 min)** - to restore normal pH

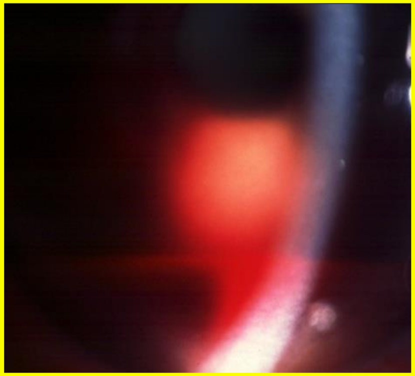
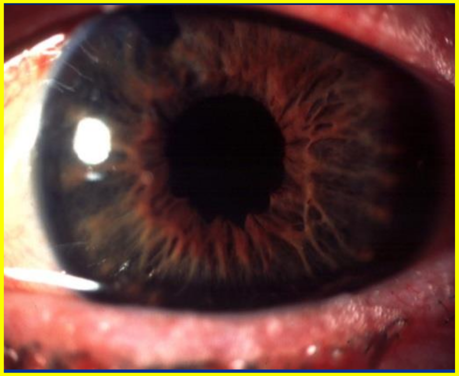
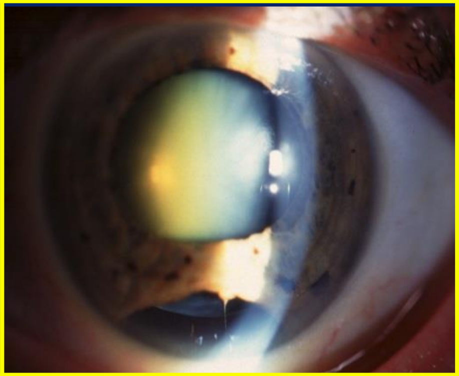
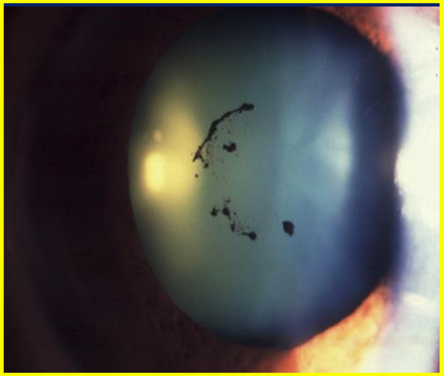
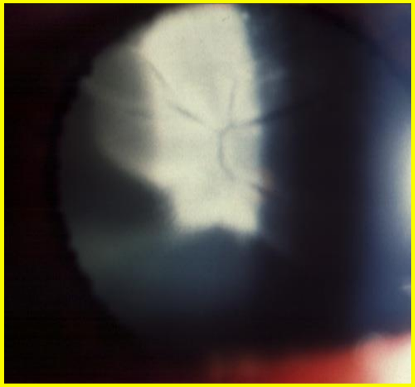
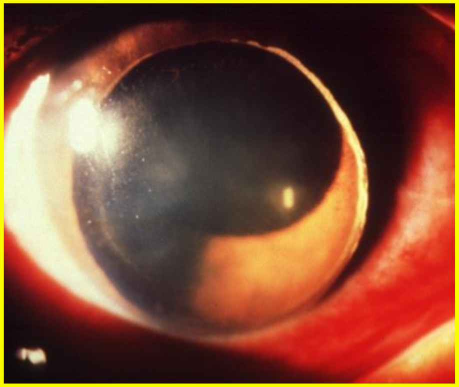
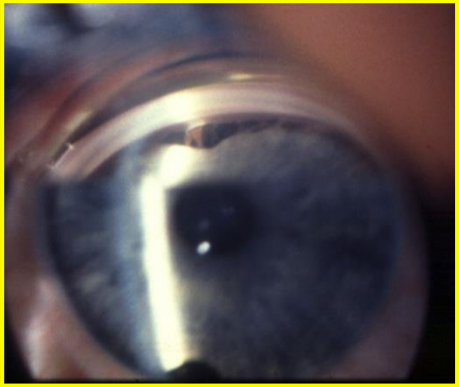
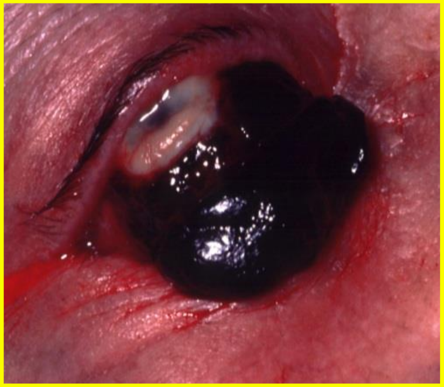
2. **Topical steroids (first 7-10 days)** - to reduce inflammation

3. **Topical and systemic ascorbic acid** - to enhance collagen production

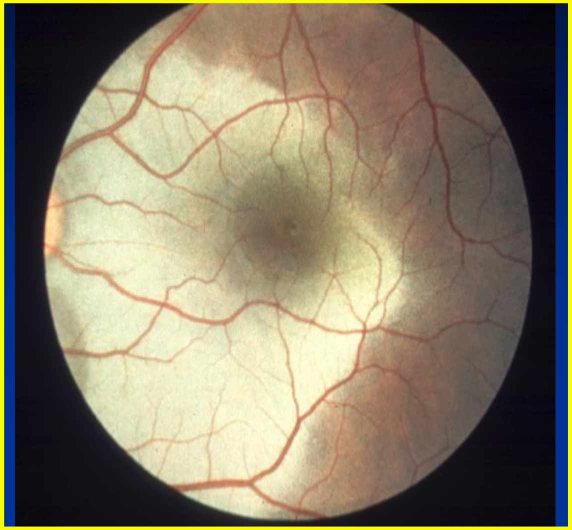
4. **Topical citric acid** - to inhibit neutrophil activity

5. **Topical and systemic tetracycline** - to inhibit collagenase and neutrophil activity

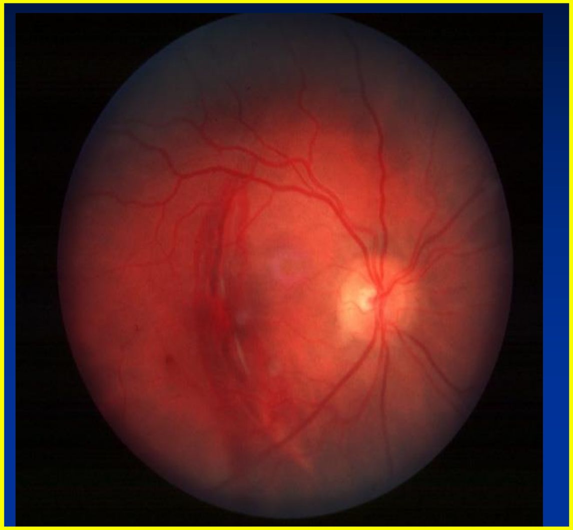
Anterior segment complications of blunt trauma

			
Hyphaema	**Sphincter tear**	**Iridodialysis**	**Vossius ring**
			
Cataract	**Lens subluxation**	**Angle recession**	**Rupture of globe**

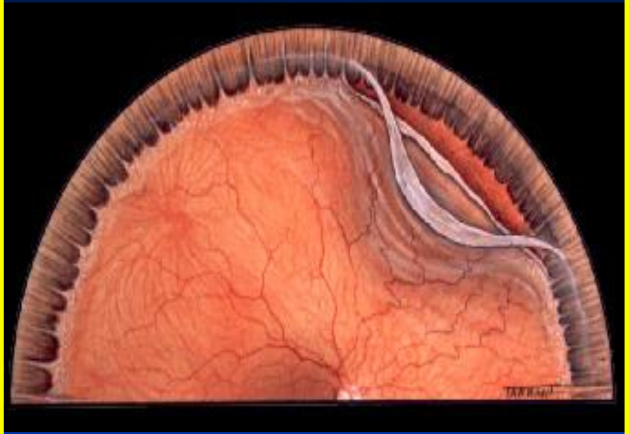
Posterior segment complications of blunt trauma



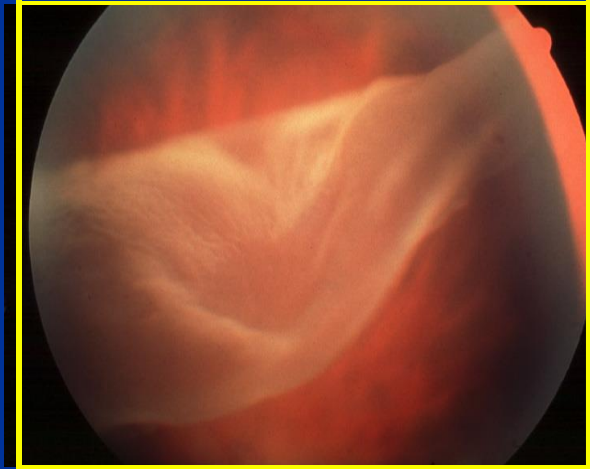
Commotio retinae



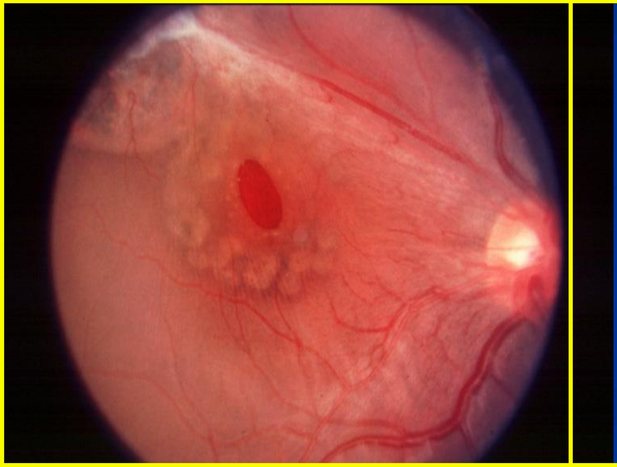
Choroidal rupture and haemorrhage



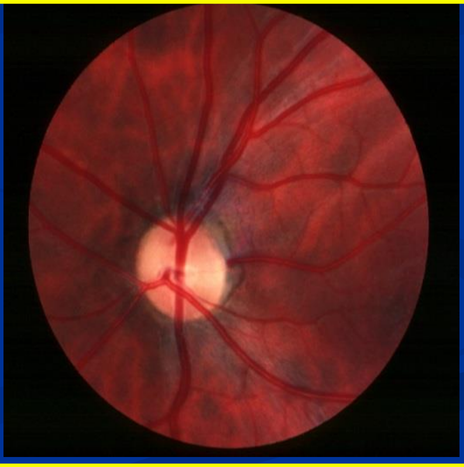
Avulsion of vitreous base and retinal dialysis



Equatorial tears

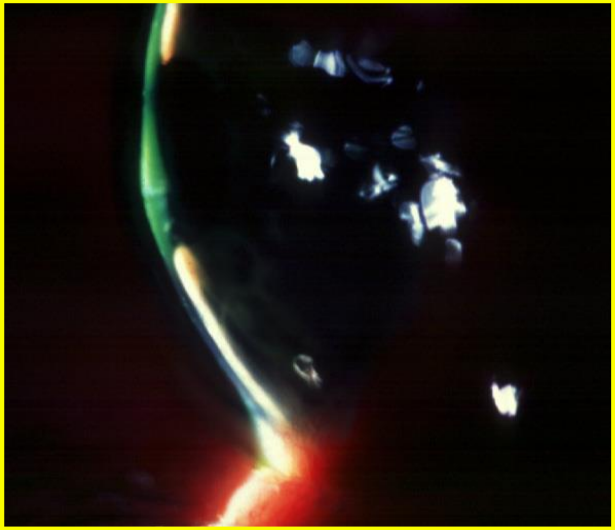


Macular hole

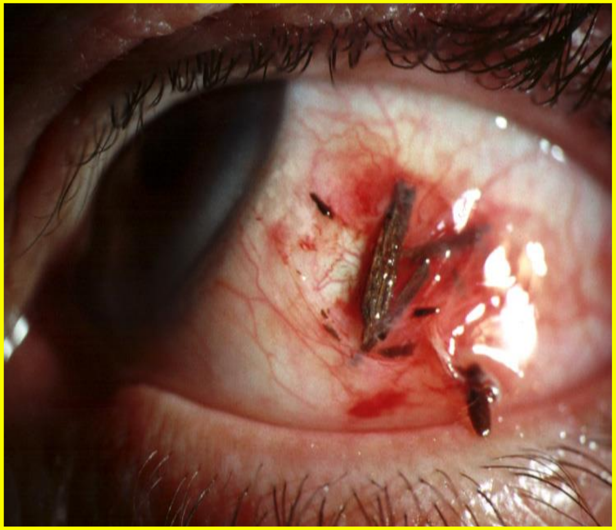


Optic neuropathy

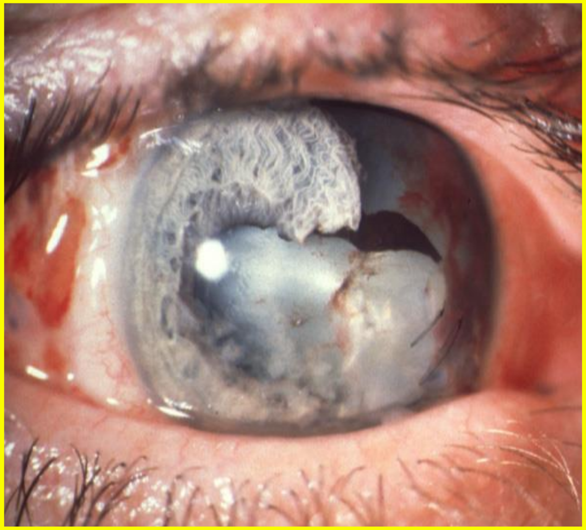
Complications of penetrating trauma



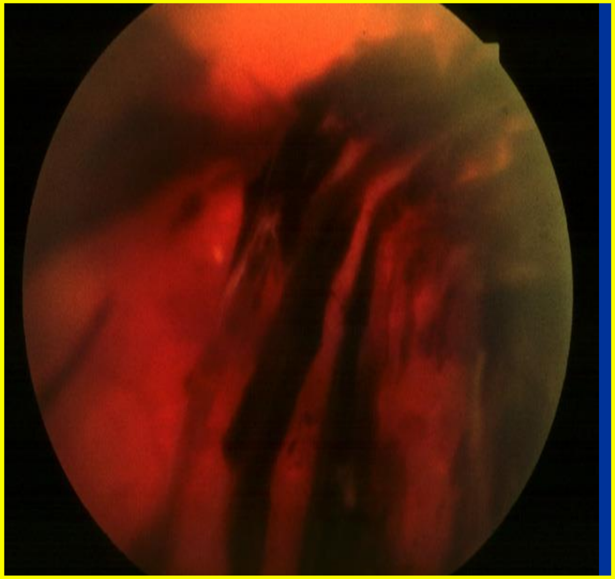
Flat anterior chamber



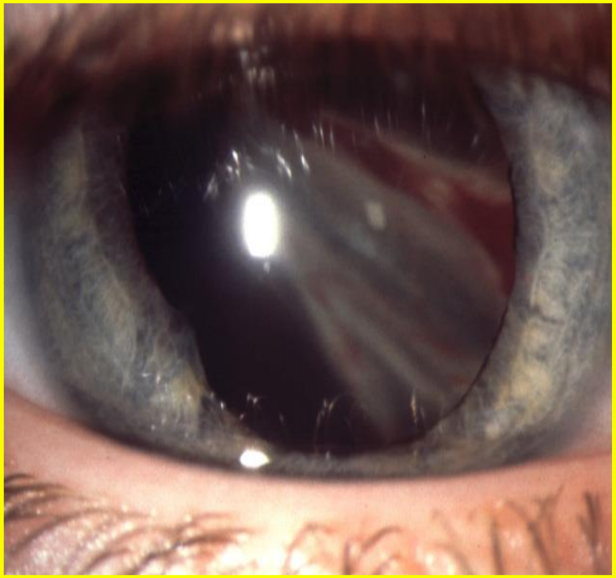
Uveal prolapse



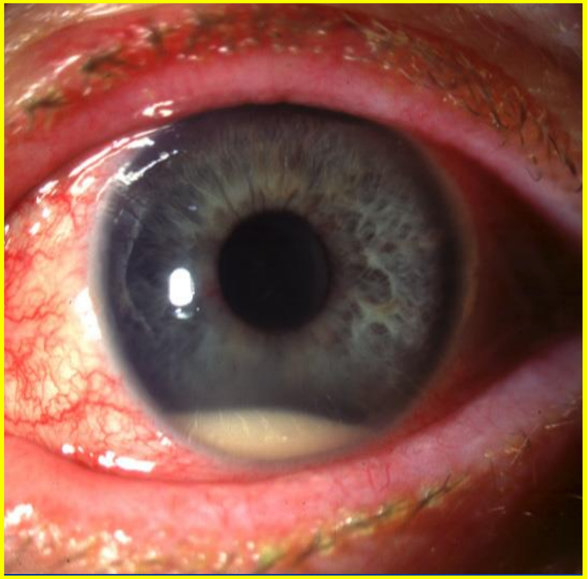
Damage to lens and iris



Vitreous haemorrhage



Tractional retinal detachment



Endophthalmitis